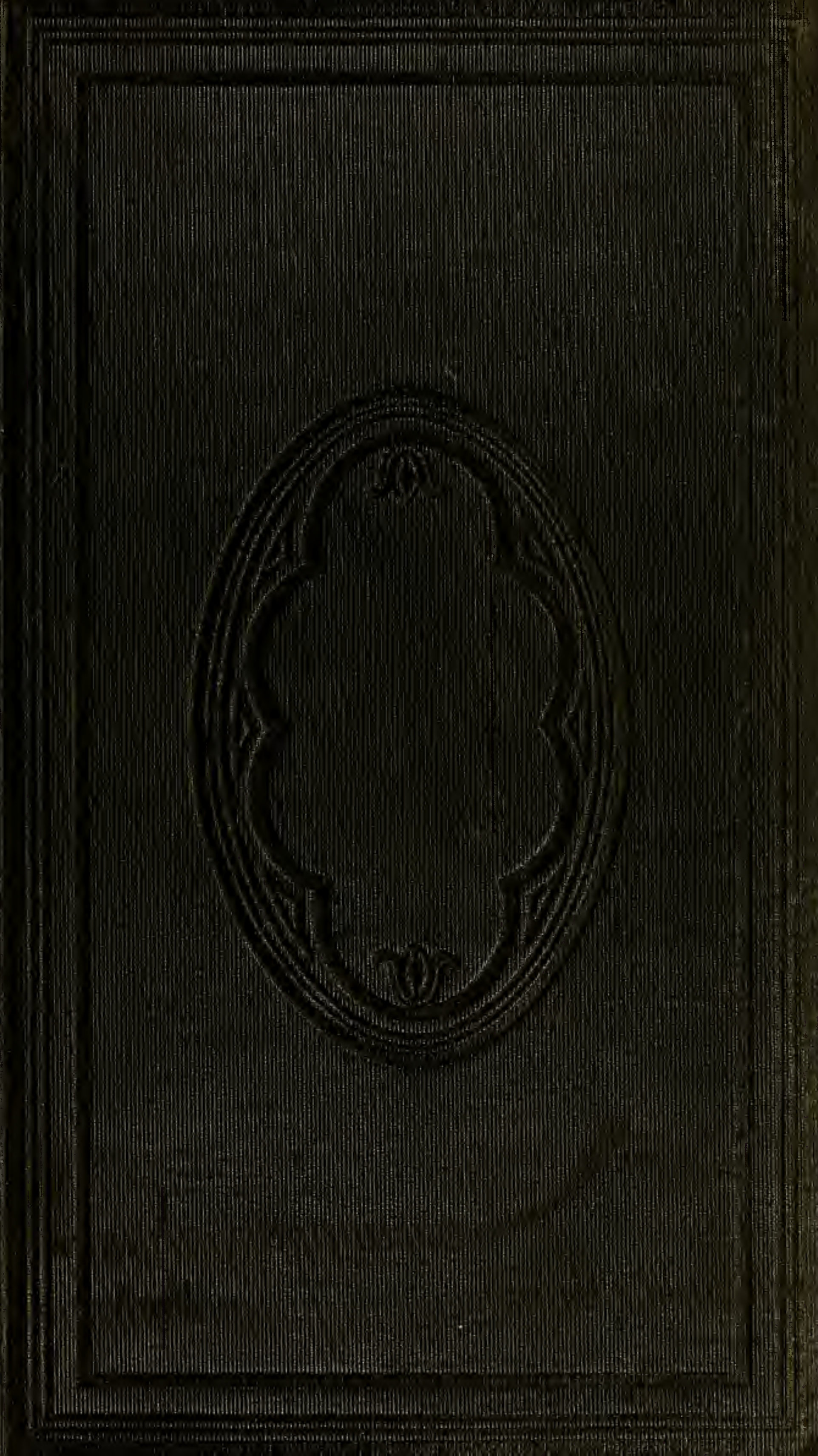


MASSACHUSETTS
STATE COLLEGE

GOODELL
LIBRARY

J. R.

613.07 M38
Bact. + Phys. 1869

THIS BOOK-PLATE IS A GIFT OF DR. WILLIAM GOODELL

Digitized by the Internet Archive
in 2010 with funding from
Boston Library Consortium Member Libraries

http://www.archive.org/details/annualreportofst1869mass

PUBLIC DOCUMENT...... ......No. 39.

FIRST ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS.

JANUARY, 1870.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
79 MILK STREET, (CORNER OF FEDERAL.)
1870.

613
.07
M38, 1869

ACT. & PHYS.

CONTENTS.

PAGE

1. Report of the Board, ... 1
2. Report of the Secretary, ... 7
3. Report on Slaughtering, ... 20
4. Report on the Sale of Poisons, ... 38
5. The Prevention of Disease, ... 42
6. Expenses of the Board, ... 58

ALPHABETICAL INDEX.

PAGE

Abattoirs, 31
Abattoirs, description of, near Paris, 36
Abattoirs, need of building, 31
Act establishing the Board, 7
Air, impure, 51
Air, value of fresh, 51
Albumen from blood of Cattle, 30
Albumen from blood of Sheep, 35
Albumen from blood of Pigs, 35
Albumen, mode of making, 33
Albumen, increased price of, 33
Apothecaries, Education of, 40
Apothecaries, Business of, 40
Architects should study Ventilation, 52

Board, Duties of, 12
Board, Establishment of, 7
Board, Members of, 8
Board, Organization of, 14
Board, Principles of action of, 1
Board, Report of the, 1
Beast, Carrion, 24
Blood, value of, 29, 33
Blood, Serum of, 29, 34
Blood, Fibrine of, 31
Blood, dried, 30
Bone-boiling, 26
Bowditch, Address of Dr., 9
Brighton, Health of, 24
Brighton, Death-rates of, 24
Brighton, future Character and Health of, 25
Brighton, Pig-pens of, 23

PAGE
Brighton, Report of Town of, 21
Butchers' Hide and Melting Association, New York, 27
By-Laws, 13

Calico-printers, use of Albumen by, 30
Cellars, 53
Circular issued by Board, 15
Clark, Dr. H. G., Report on Brighton in 1866, 21
Cleanliness, 56
Clerks of Towns, 18
Combustion of vapors from fat-melting, 28
Condensation of vapors from fat-melting, 28
Contagion, Diseases propagated by, 49
Consumption, Prevention of, 45
Consumption, diminishing Mortality from, 47

Dead Animals, 26
Disease, Prevention of, 42
Drains, imperfectly trapped, 53
Drainage of Slaughter-houses, 23
Drainage of Towns in England, 46

Earth, disinfecting power of, 54
Earth Closets, 5
Economy by Improved Modes of Slaughtering, 32
Expenses of State Board of Health, 6, 58

Faroe Islands, 49
Farr, Address of Dr., 10
Fat-melting, 26
Fat from Slaughter-houses, 23

Health, information concerning, 5
Heating Apparatus, Care of, 52
Hogs fed on offal, 24
Homes for the Poor, 4
Houses, Model Lodging, 4
Houses in the Country, 53
Houses, Tenement, 4
Hygiene, Public, 55

PAGE

Investigation, Subjects for, ... 14

La Villette, visit to, in 1867, ... 36
Law relative to sale of Poisons, ... 38
Laws relative to Public Health, ... 16
Liquor, effects of use of Intoxicating, ... 5
Lock-ups, ... 6

Mortality in principal Towns, ... 17

New York, diminished Mortality in, ... 56
Nuisances complained of, ... 6, 18

Offal of Slaughter-houses, ... 22
Office for business of Board, ... 6, 19
Organic Matter in Air, ... 52

Physicians, Prescriptions of, ... 41
Pig-pens of Brighton, ... 23
Poisons, Report on sale of, ... 38
Prevention of Disease, ... 42
Prevention of Disease in the Household, ... 51
Prevention of Disease in the Community, ... 55

Rendering Dock in New York, ... 28
Remedies proposed with regard to Slaughtering, ... 27
Report on sale of Poisons, ... 38
Report on Slaughtering, ... 20
Report, time of making Annual, ... 19
Report of Secretary, ... 7
Room needed for Board Meetings, ... 6, 19

Sanitary Influences, ... 57
Sanitary Advantages of improved modes of Slaughtering, . . 32
Secretary, Report of the, ... 7
Slaughtering for Boston Market, ... 20
Slaughtered, number of Animals, ... 20
Societé Industrielle de Mulhouse, ... 33
Soil Moisture as a cause of Consumption, ... 46
State Medicine, ... 9
Spectacle Island, ... 26
Sugar Refiners, use of Albumen by, ... 30

PAGE
Terms to Butchers for use of Abattoirs, ... 28
Typhoid Fever, Prevention of, ... 44

Ventilation, ... 51
Ventilation by open Fires, ... 48

Water, quality of, ... 55
Wells, ... 53

Commonwealth of Massachusetts.

STATE BOARD OF HEALTH,
January 10, 1870.

To the Honorable the Senate and House of Representatives.

We congratulate the legislature on the fact that the comprehensive idea included under the term of "State Medicine" has at length been established in Massachusetts.

We feel the responsibilities of the position that we hold. We accept them with an earnest wish to be able to grapple successfully with the various difficulties that surround the commencement of this very important branch of the public service.

In accordance with the law passed June 21, 1869, we now present the First Annual Report of the State Board of Health.

GENERAL PRINCIPLES OF ACTION.

Before proceeding to its details, we desire to give the general principles upon which we have acted in its preparation.

No board of health, if it rightly perform its duty, can separate the physical from the moral and intellectual natures of man. These three qualities of man are really indissoluble, and mutually act and react upon each other. Any influence exerted to the injury of one, inevitably, though perhaps very indirectly, injures another. As in the physical world there is a correlation of forces, so that no force is ever lost, but only interchanged with another, so do these various powers and qualities of man act upon each other, and act and are acted on by the physical forces of nature that surround him.

By the careful and comprehensive study of these various laws and of their relations, the highest department of the physician's art is brought into operation. But no man or private body of men has the ability to study and to develop this department as a free Commonwealth can do when acting through the agency of a few persons who are devoted to this object, and who come willingly to the work, and armed with the power and the ample means of the State. Hence the term "State Medicine," though criticized by some, becomes a most appropriate and terse expression of the position which our Commonwealth has now assumed.

From the earliest colonial days, the general court has assumed to itself the right to prescribe rules for the intellectual and moral health of the people. The aids given to our colleges and to our primary and normal schools, and recently by authorizing the establishment of public libraries by cities and towns, all testify to the labors of the Commonwealth in reference to these two of the above-named powers of man. But it may well be doubted whether, in the earnest desire to stimulate the intellectual powers of its people, the State has not neglected somewhat the moral, and almost wholly lost sight of the physical nature of man.

The State Board of Health, according to our estimate of its objects, should neglect none of these three, and if, in this or any future report, it should study any supposed evil upon man, it will adopt the fine old maxim, pagan though it be, that nothing which pertains to humanity, in its widest sense, will this Board deem foreign to its aims.

We have thought it well thus to lay down certain general principles upon which we intend to act.

We now pass to a brief statement of what has been done by the Board since its organization in September.

Secretary's Report.

In the Secretary's report will be found the account of the organization of the Board, and a summary of its doings to the present time; also allusions to certain nuisances, in which he has been already able to be of service as an unbiassed umpire under State authority. His remarks about the necessity of having some room provided for business of the Board, and also upon the propriety of the Board reporting in future in print, we commend to the notice of the legislature.

It was the unanimous opinion of the Board that it would be better to study a few questions only, and to do so thoroughly, rather than to waste time by running over a larger field, including many important subjects, but none of which could be examined in an exhaustive manner during the time left before the close of the year. Accordingly it was decided to take up the three following

SPECIAL QUESTIONS.

1. *Sale of Poisons.*

What should be done in reference to the sale of poisons, in order to prevent, if possible, the frequent occurrence of death from these substances being sold by boys and men ignorant of pharmacy, or careless in the dealing out of these dangerous drugs?

After mature consideration of the subject, the Board came to the conclusion that although the present law relative to the sale of poisons is really useless, there could not be, from the very nature of the case, any law devised restraining the sale of articles specially designated that would not in like manner become useless in a short time.

Therefore the Board feel that the promotion of a high education among apothecaries and their assistants, and, as far as possible, by legislation, the prevention of ignorant and unscrupulous persons from practising the apothecary's art, are the best modes of dealing with the subject. The specific methods to be pursued by legislation to gain these ends must be left to the wisdom of the general court.

2. *Slaughtering for the Boston Market.*

We commend this report to the candid and close attention, not only of the legislature, but also of the inhabitants of those towns in which slaughter-houses are found. For although deaths, for various reasons, may not be more numerous in these towns than in others, it seems to the Board highly improper to wait until such results are reached, as they inevitably will be if the present evil in the management of this business be allowed to go onward unchecked. Besides, we have reason to believe, that although an excessive number of deaths may not be found in these towns, it by no means follows that there may not be numerous slighter and persistent discomforts, and many actual derangements of the system, which are unknown to our State registration.

When, therefore, we consider that slaughter-houses, as conducted in the vicinity of Boston, are nuisances now, and that they will become greater ones hereafter, and that all large cities like London, Paris, and, more recently, New York, have found it advisable to build abattoirs for slaughtering, it may well be questioned whether the legislature would not be doing wisely if it were to allow the inhabitants of towns thus tainted either to build such abattoirs at the public expense, or authorize private enterprise to do so. Should this be accomplished by either method, we know from the experience of other cities that nothing but good will result, while at the same time waste, which now is very great, will be prevented, and money will thus be saved.

The report fully sustains these remarks.

3. *Comparison of Model Lodging-Houses and Common Tenement Houses—their relative effects upon the Health and Morals of the People.*

The Board regrets that it cannot complete this investigation in time for the present Report, but proposes to pursue the inquiry during the coming year. The Board, however, cannot dismiss this subject, without bringing to the notice of philanthropists some facts already brought out, viz., that the model lodging-house, while giving to the poor at a very cheap rent a perfectly clean though humble home, with all the appliances of modern civilization, thus doing much towards promoting temperance and all the domestic virtues, really gives a good return to capital in a six per cent. interest as *net* profit for the money thus expended. Surely these buildings are among the most satisfactory of the many benevolent undertakings this age has seen.

CHEAP HOMES FOR THE POOR IMPERIOUSLY CALLED FOR AT THE PRESENT TIME.

At the present time cheap homes for the poor are *imperiously called* for in Boston, owing to the sudden destruction of Fort Hill, whereby very large numbers have been thrown from homes they have for years inhabited.

INFORMATION ON HEALTH FOR THE PEOPLE.

By law we are required from time to time to give information to the people respecting health. In accordance with that proviso, the Board decided to publish for more general distribution some remarks made by our Secretary before the Boston Social Science Association, as subsequently modified and extended by him. There is one subject named therein to which the Board wishes to draw especial attention, viz.:

THE EARTH CLOSET.

This is one of the simplest and yet one of the most useful discoveries of modern times. Hereafter, if we are wise, we shall apply this simple means for the purification of vaults in every place where water is not used for that purpose, as in our great cities. In the country it will be invaluable. And whenever in private homes cholera or typhoid fever or any contagious disease may occur, there should this principle involved in the Earth Closet be adopted.

THE USE OF INTOXICATING LIQUOR, AS A BEVERAGE.

The fourth section of the Act establishing this Board reads as follows:—

> "It shall be the duty of the board, and they are hereby instructed, to examine into and report what in their judgment is the effect of the use of intoxicating liquor, as a beverage, upon the industry, prosperity, happiness, health and lives of the citizens of the state. Also what additional legislation, if any, is necessary in the premises."

This opens to the Board of Health a very wide field of investigation and inquiry; one over which the advocates of opposite opinions upon the questions involved, have carried on an animated, not to say bitter controversy for many years.

It seemed to the Board that upon questions which have so long engrossed public attention, and about which scientific and professional men and legislators differ so widely, any opinions or judgments of this Board, to be of value, should be formed and published after a full and careful reëxamination of facts and arguments, which alone can be the proper grounds of such opinions and judgments.

The time since the organization of the Board has been entirely insufficient for making such necessary examination.

With more time and ampler opportunities the Board hope to be able hereafter to present such facts and conclusions as may be of some service to the citizen in the conduct of life, and to the legislator in the discharge of his responsible duty.

Nuisances, and the doings of the Board thereupon.

Among the nuisances mentioned in the Secretary's report and which the Board was called on to examine, was one relative to the places used as "lock-ups." The subject is one well worthy the consideration of the legislature, for certainly many places for the detention of persons accused of crime now exist in this Commonwealth, which are unfit for any human being to stay in even for a few hours.

Expenses of the Board.

It will be seen that the expenses of the Board have fallen far within the limit generously granted by the State. It is hoped that the same liberality evinced last year by the legislature will be shown in the future. The Board intends, by employing learned experts and others to make special investigations, to be able to render their own reports of much greater value. For this purpose funds will be needed.

No Room for Board Meetings.

The Board regrets to say that it has as yet no room appointed for its use. The Secretary has been compelled to use his own private office for public work. During the session of the legislature we have absolutely no place for our meetings; the room in which we have hitherto met being then needed as a committee room. We ask the aid of the general court to supply this want.

All which is respectfully submitted.

HENRY I. BOWDITCH.
GEORGE DERBY.
P. EMORY ALDRICH.
WM. C. CHAPIN.
WARREN SAWYER.
R. FROTHINGHAM.
R. T. DAVIS.

REPORT OF THE SECRETARY.

To the State Board of Health:—

Gentlemen,—The following history of the Board will explain, in a connected form, the kind of work in which we have been engaged since our organization.

Establishment of the Board.

The Act establishing a State Board of Health in Massachusetts is as follows:—

An Act to establish a State Board of Health.

Section 1. The governor, with the advice and consent of the council, shall appoint seven persons who shall constitute the Board of Health and Vital Statistics. The persons so appointed shall hold their offices for seven years: *provided*, that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire each year, and the vacancies so created, as well as all vacancies occurring otherwise, shall be filled by the governor with the advice and consent of the council; but any one may be reappointed.

Sect. 2. The board shall take cognizance of the interests of health and life among the citizens of this Commonwealth. They shall make sanitary investigations and inquiries in respect to the people, the causes of disease, and especially of epidemics, and the sources of mortality and the effects of localities, employments, conditions and circumstances on the public health; and they shall gather such information in respect to those matters as they may deem proper, for diffusion among the people. They shall advise the government in regard to the location of any public institutions. They shall in the month of January, make report to the legislature of their doings, investigations and discoveries during the year ending December thirty-first, with such suggestions as to legislative action as they may deem necessary.

Sect. 3. The board shall meet at the state house once in three months, and as much oftener as they may deem expedient. No member, except the secretary, shall receive any compensation, but the actual personal expenses of any member while engaged in the duties of the board shall be allowed and paid.

Sect. 4. It shall be the duty of the board, and they are hereby instructed, to examine into, and report what, in their best judgment is the effect of the use of intoxicating liquor as a beverage, upon the industry, prosperity, happiness, health and lives of the citizens of the state. Also what additional legislation, if any, is necessary in the premises.

Sect. 5. The board shall elect a secretary, either from their own number, or otherwise; but when elected he shall be a member of the board, and their executive officer. He shall perform and superintend the work prescribed in this law, and such other duties as the board may require. He shall receive from the treasury, in quarterly payments, an annual salary of twenty-five hundred dollars and his necessary travelling expenses incurred in the performance of official duties, after they have been audited by the board and approved by the governor and council, and all other necessary expenses arising in his office shall be paid out of the treasury in the same manner as those of the different departments of the government.

Sect. 6. This act shall take effect upon its passage. [*June* 21, 1869.

In accordance with the provisions of this Act, His Excellency, the Governor, with the advice and consent of the council appointed the following named persons to constitute the State Board of Health, their commissions bearing date July 31, 1869:

Henry I. Bowditch, ...	*for seven years.*
George Derby, ...	*six years.*
P. Emory Aldrich, ...	*five years.*
William C. Chapin, ...	*four years.*
Warren Sawyer, ...	*three years.*
Richard Frothingham, . . .	*two years.*
Robert T. Davis, ...	*one year.*

The first meeting of the Board was held at the State House, September 15, 1869, on which occasion the senior member, Dr. Bowditch, made the following address:—

Gentlemen of the State Board of Health:

By the orders of the Governor of the Commonwealth, it devolves upon me to call you together. As the subject-matters for our discussion may be somewhat indefinite in all of our minds, I take the liberty of addressing a few words to you, in order that you may know not only what I consider the general nature of our duties, but may also understand how high I place these duties when I consider them in their relations to the present and future health of the citizens of the State. I may be mistaken in my estimate of the importance of the movement, the commencement of which to-day devolves upon us. I confess to you that I know of no higher office in the State than that which we now hold, viz., that of inaugurating the idea of "State Medicine" in Massachusetts. Upon our high or low appreciation of the position and of the duties resulting from that position, and upon our wise or foolish performance of these duties, depends the success of the object aimed at in the establishment of a State Board of Health. The last legislature, unconsciously, perhaps, on the part of many members thereof, has proposed a system that may be made by us capable of good to the citizens in all future time, or it may prove a perfect abortion. Our work is for the far future as well as for the present, and at this very opening of our labors we should try to place ourselves above the region of merely local or temporary excitement or of partisan warfare, in order that we may act wisely and for the ultimate good of the whole people.

In these introductory general remarks, as you will see, my object has been to impress upon you my views of the essential dignity of the offices we now hold, and that we should assume them with minds loyal to the truth and under a sense of individual responsibility in the premises.

I have used one expression about which I wish to enter into some detail, viz., "State Medicine in Massachusetts." What is the precise meaning of the expression? It is of very recent growth in our language. It has, in fact, arisen, I believe, within the last few years in England, where already it has become a great power for good. Its objects rank among the most important matters now discussed by the highest intellects and humanest hearts in Great Britain. It is, as I understand it, a special function of a state authority, which until these later days of scientific investigation has been left almost wholly unperformed or exercised only under the greatest incitements to its operation, such as the coming of the plague, cholera, smallpox, or some other equally malignant disease. By this function the authorities of a state are bound to take care of the public health, to investigate the causes of epidemic and of other diseases, in order that each citizen may not only have as long a life as nature would give him, but likewise as healthy a life as possible. As the chief object of the physician is the cure, if possible, of any ailment which is submitted to his care, so the far higher aim of State Medicine is, by its thorough and scientific investigations of the hidden causes of diseases that are constantly at work in an ignorant or debased community, to prevent the very origination of such diseases. Much has already been suggested in England towards the crushing out of fevers, &c. Still more recently one of the grandest results of State Medicine is its virtual recognition under international law by the appointment of joint governmental commissioners for the investigation and prevention of the spread of Asiatic cholera.

The history of State Medicine in Great Britain may be briefly summed up as follows:—

Only twenty-one years ago, *i. e.* in 1848, England, stimulated by the medical profession and the philanthropists, passed an Act establishing a "General Board of Health." It gave very extensive powers, and statements of its doings from year to year were published by Parliament. The Registrar-General's reports also tended to open the eyes of all to the importance of more thoroughness of work.

In the early part of 1858, the Privy Council of England was directed to consider the matter of public health. Accordingly its chief medical officer, Mr. Simon, one of the most eminent of the medical profession of London, was ordered to report to the council on any matters pertaining to that subject. Every year since then he has sent out, under official sanction, very valuable documents. He has been allowed to call to his aid all the special talent in the kingdom; and investigations of importance not only to the State, but to the science of medicine, have been annually made and published by the council. And I beg you to bear in mind that all these investigations have been made by the State with one sole object in view, viz., the improvement in human health, and for the lengthening out of human life of each individual man or woman. Certainly no object can be nobler, none more deserving of the attention of learned men or of philanthropists or statesmen.

Dr. Farr, (*Medical Times and Gazette*, July 31, 1869,) in his very recent and able address as president of the section on State Medicine in the British Medical Association, pursues the following lines of thought upon this subject:—"Public hygiene is a want as much as air, and public roads and waters are public necessities, and as such must be cared for and paid for by the community." Diseases as disastrous as those among the Greek hosts before Troy, befel the English camp in the Crimea. Before Troy, appeals by prayer were made to appease the anger of the gods; but God's divine laws of hygiene were unknown or uncared for. During the Crimean war the people of England not only prayed, but with indignant haste they hurled from power an inefficient ministry because it neglected these same laws. Out of this upheaval of the nation's heart arose Florence Nightingale and Lord Herbert, with their Christian sanitary law, bringing health and comparative comfort to the war-worn soldier.

"A sanitary code," says Dr. Farr, "is needed, with proper sanitary officers; for otherwise a code would be a dead letter." Hence, continues he, "a Ministry of Public Health will eventually be needed for the British Empire." I would remark, in passing, that Jeremy Bentham suggested in his "Constitutional Code" the same idea more than thirty years ago. "Such a ministry," says Dr. Farr, "would divide itself into four departments—administration, medicine, engineering, statistics—each of which should be organized so as to work in harmony with a council of health and executive heads. Each town should have its board of health and its health physician in communication with and in aid of the Central Board of Health."

But public health has so wide a field that help is needed from all; from the chemist, the engineer, the naturalist, and from the humblest citizen as well as the highest statesman.

"The primary object of public medicine," says Dr. F., "is to prevent disease, but it also surrounds the sick with conditions most favorable to recovery, and diminishes the death-roll of the people."

Dr. Farr concludes his admirable address with the following thought:—"Supposing every condition favorable for the perfect operation of the powers of State Medicine, we should still see grave defects in many persons; shortcomings in others; in many, organic degeneracies; in many, criminal depravities."

"How out of the existing seed to raise races of men to divine perfection is the final problem of public medicine."

You see, gentlemen, from these memoranda taken from Dr. Farr's address, that I am not alone in considering the objects we have to care for as among the highest that can be presented to any reasonable man, or to any lover of his race.

The establishment of our Board by the last general court inaugurates this system of State Medicine in Massachusetts. I think that this is the first State Board of Health established by any American State; at least, with objects as extensive as those now given to our charge.

The law under which we act, while not specifying so much as the English law of 1848, gives us the amplest powers for investigation and funds at our disposal for any legitimate purpose.

Let us look for a moment at some of the general objects and duties involved in the Act establishing our Board.

First. It directs the Board to take cognizance of everything tending to public health, and of course requires us to endeavor to eradicate everything tending to public disease and death.

Second. It directs us to diffuse among the people a knowledge of the means of obtaining individual and public health and of preventing disease.

Third. We are ordered to investigate the effects of the use of intoxicating liquors upon the industry, prosperity, happiness, health and lives of the people, and it is intimated that we may suggest legislation on any or all of the subjects committed to us for investigation.

Now in order that the workings of the Board may become harmonious and of real service, it is a self-evident proposition that exact methods of procedure must be followed in all cases, and that certain by-laws for the legal governance of the Board will be necessary, and which shall not be varied from except under special direction at a full meeting of the Board.

[Dr. Bowditch then proceeded to suggest certain plans for the organization of the Board, and continued as follows:]—

The law requires us to diffuse among our people any already established laws of public health, and also whatever we may hereafter discover on that subject. I look upon this feature of the law with deep interest, for I believe by it we *may* do much service to the people.

How shall we diffuse this knowledge? Permit me to allude to a few evident methods.

(*a.*) By lectures from our Secretary or from members of the Board on various special subjects connected with public hygiene—such as ventilating, and building, and location of houses; on various well-known diseases capable of partial or entire prevention on knowledge of causes being given. It may be a question, moreover, whether we should not authorize the Secretary to communicate with lecture committees of various towns and the American Literary Bureaus, and to make arrangements with physicians and others to deliver lectures relating to public health in various towns.

(*b.*) By the Secretary holding meetings in the various parts of the State for discussions on the subject; meetings analogous to those now held on education, agriculture, &c. He might invite the coöperation of local medical societies or special physicians. I have no doubt that such meetings, properly conducted, would attract the attention and interest of the public.

(*c.*) By the publication in a compact form and the wide circulation of the pith, so to speak, of our general knowledge on public hygiene. How this should be done would remain an open question. If it could be done, there is no doubt of the good that would eventually result.

(*d.*) By our annual reports to the legislature, which, I trust, will always be models of brevity and of compact learning—not a word too much or a word for effect merely—and so thoroughly indexed that even the busiest man on 'change can in three minutes get at the essentials, and be prepared to study the details of any part or parts he may wish further to examine.

In conclusion, gentlemen, let me say that, while I feel alike our grave responsibilities and the dignity conferred on each one of us by His Excellency the Governor in his selection of us for these offices, I have at the same time no misgivings; but on the contrary, the liveliest hope that this Board will faithfully and in an able manner perform its duties, and that thus it will become a real blessing to our State, not only at the present time, but long after every member of it has died. It will assuredly be such if we, the necessary originators of its various details, only look at our duties in the light of the broadest philanthropy and, as far as in us lies, the wisest statesmanship, and finally with all the knowledge that modern science can at present give us.

In making these introductory remarks, I have done only what seemed to be proper; but I hope that others will speak what seems to them good, so that starting on our new career with understanding minds and buoyant and willing hearts, we may vigorously inaugurate State Medicine in Massachusetts.

At a subsequent meeting on the 22d of September the following By-laws were adopted for the government of the Board.

BY-LAWS.

1. A Chairman and a Secretary for the Board shall be chosen by ballot.

2. Regular meetings of the Board shall be held at the State house, in Boston, on the first Wednesdays of January, April, July and October, at eleven, A. M.

3. At the meeting in January the Chairman and Secretary shall be chosen, to hold their offices during the ensuing year.

4. Special meetings may be called at any time by the Chairman, or at the request of any two members.

5. Four members shall constitute a quorum for the transaction of business.

At the same meeting the organization of the Board for the remainder of the year was completed by the choice of Henry I. Bowditch as Chairman, and George Derby as Secretary.

In considering the nature of their duties, as defined by the Act, it seemed to the Board expedient to select certain subjects for investigation during the short time which remained before report was to be made to the legislature, and to leave all others for the present, except such as might be brought before them requiring immediate action. From among a large number of subjects proposed for examination the following were selected.

Subjects Selected for Special Investigation.

1. The prevailing modes of slaughtering, with especial reference to the supplies of fresh meat for Boston market.

2. The sale of poisons.

3. Compliance with the instructions contained in the fourth section of the Act establishing the Board, relative to the effects of the use of intoxicating liquor.

4. A comparison of the amount of sickness and mortality in different kinds of houses occupied by the poor.

In addition to these subjects for special investigation, it was determined,—

5. To address a circular to the local boards of health throughout the State as to their powers and duties under existing laws; and,

6. To collect and publish weekly the number of deaths, and their prevailing causes, in the most populous cities and towns of the State.

The result of this plan will appear in the following pages, which contain reports upon the first and second subjects designated, and in their preparation every member of the Board has participated. The third subject, relating to the effects of intoxicating drinks, has been necessarily postponed in accordance with reasons assigned in the preceding Report of the Board. The fourth subject has been diligently worked, but it has been thought best to postpone the publication of such results as are already attained, in order that the inquiry should cover a much larger field than was at first proposed.

The fifth and sixth divisions of our plan of operations for 1869 have been fully carried out.

The following circular issued in October, 1869, has been sent to the mayor and board of health of every city, to the selectmen of every town, to every member of the legislature of 1869, and to every clergyman and physician in Massachusetts.

COMMONWEALTH OF MASSACHUSETTS.

State Board of Health,
State House, Boston, October, 1869.

To the Boards of Health of the several Cities and Towns of Massachusetts:

The undersigned have recently been appointed by the governor and council, to constitute the "State Board of Health," under an Act passed by the last legislature.

In entering upon our duties, which are rather advisory than executive, we desire to establish such communication with the local boards having this important subject in charge, that all may work together for the common advantage of the people, for the prevention of disease, and for the prolongation of life.

We believe that all citizens have an inherent right to the enjoyment of pure and uncontaminated air, and water, and soil; that this right should be regarded as belonging to the whole community; and that no one should be allowed to trespass upon it by his carelessness, or his avarice, or even by his ignorance. This right is in a great measure recognized by the State, as appears by the General Statutes.

If these were strictly and impartially enforced, we should have a condition of public cleanliness, and of public health, which would make Massachusetts a model for all other communities. That this has not been done depends upon many causes, some of general, and others of purely local operation.

It has been doubted, whether the public mind is sufficiently aware of the dangerous elements around us; whether the connection between filth and disease is as yet proved to the public satisfaction; whether the people are convinced that undrained land is unwholesome to live upon.

All these doubts of the public intelligence have impeded the operation of our laws.

It is thought also that local and private interests have often been so strong as to paralyze the action of the health authorities.

But we hope and believe that a better time is coming; and we confidently look to you to put in force the powers which the laws have placed in your hands.

Among these laws we would particularly call your attention to—

General Statutes, chapter 26, in which are comprised stringent provisions relative to the abatement of nuisances, to vaccination, to contagion, and to offensive trades.

Also, to chapter 49, section 151, relative to the sale of milk produced from cows fed upon the refuse of breweries or distilleries, and to the sale of milk rendered unwholesome by any cause.

Also, to chapter 166, in which the law is given relative to the sale of unwholesome provisions of all kinds, whether for meat or drink; the corruption of springs, wells, reservoirs, or aqueducts; the sale of dangerous drugs, and the adulteration of drugs of every sort.

It will also be seen, on reference to chapter 211 of the Acts of the year 1866, that it is in the power of any person aggrieved by the neglect of the board of health of any city or town to abate a nuisance, to appeal to the county commissioners, who can in that case exercise all the powers of the board of health.

Chapter 253 of the Acts of 1866 authorizes boards of health to seize and destroy the meat of any calf killed when less than four weeks old.

Chapter 271 of the Acts of 1866 authorizes boards of health to appoint agents, to act for them, under certain restrictions.

The legislature of 1868 passed two Acts of great importance to the public health, to which we would respectfully and earnestly ask your attention. The first, chapter 281, 1868, applies only to the city of Boston, and relates to tenement and lodging houses, placing them under very strict regulations, for the public good.

The second, chapter 160, is of general application. It provides that in any city or town, lands which are wet, rotten or spongy, or covered with stagnant water, so as to be offensive, or injurious to health, shall be deemed a nuisance, to be abated by the board of health of such city or town. In case they refuse to act, appeal may be made, by persons aggrieved, to the superior court or any justice thereof, who may appoint three commissioners with powers equal to those possessed by boards of health.

We confidently look to you for the enforcement of these laws.

We believe that public opinion will fully support you in so doing.

We will give you all the help in our power.

There is a great work before us, which, if carried out in the letter and spirit of the laws referred to, we cannot doubt will justify the wisdom which framed them.

In making this our first communication to the boards of health of the various cities and towns of the Commonwealth, we sincerely hope that it may serve as the opening of friendly and helpful relations between us, and that it will lead to reforms, the effects of which will be evident in the improved condition of public health.

Communications addressed to our Secretary, Dr. GEORGE DERBY, State House, Boston, will be at once acknowledged, and will be laid before the State Board of Health at their next meeting.

Very respectfully, your obedient servants,

HENRY I. BOWDITCH,
GEORGE DERBY,
ROBERT T. DAVIS,
RICHARD FROTHINGHAM,
P. EMORY ALDRICH,
WARREN SAWYER,
WILLIAM C. CHAPIN.
State Board of Health.

MORTALITY IN THE CENTRES OF POPULATION.

The weekly publication of the number of deaths and of their prevailing causes in the principal cities and towns of the State was commenced in the Boston Morning Journal of November 3, 1869, and has been continued each Wednesday to the present time. The information contained in these reports is derived from twenty cities and towns, containing about half the population of the State. The clerks and registrars send returns to the State Board of Health, in which are specified all the deaths which have occurred in the preceding week from diseases which have any claim to be regarded as preventable, including all those which prevail as epidemics. For this purpose printed blanks are furnished.

From these materials a return in a very simple form is made for publication, showing the total mortality for the week, and *the drift of all epidemic influence.* It is hoped that these reports will be found interesting and useful, not only to physicians, but to the general public.

Although by no means as complete in their details as those ultimately furnished through the Registration Reports, they have the great advantage of referring to the present time. If small-pox, or scarlet fever, or any of the infectious epidemics prevail, the fact will be at once evident, and the danger to public health can be estimated without recourse to rumor, which in such cases always exaggerates and often unnecessarily alarms. We desire to express our cordial thanks to the clerks of the several cities and towns for their ready and hearty coöperation in the collection and transmission of these reports of mortality. The labor is a gratuitous one, often requiring attention among other pressing duties, and is undertaken solely for the public good at the request of the State Board of Health.

While the attention of the Board has been mainly directed to the subjects previously referred to, they have also had business of interest and importance brought before them by citizens in different parts of the State who were engaged in the prosecution of nuisances, or who felt aggrieved by their existence and wished our help to remove them. Among these subjects of complaint may be mentioned, to show their character and diversity:—

1st. The condition of "*lock-ups*" with reference to light and air.

2d. The pollution of streams by goat-skin factories, and tanneries.

3d. The influence of mill-ponds upon health.

4th. The building a receiving-tomb for the dead on the public highway and in the vicinity of dwelling-houses.

5th. Undrained land.

6th. Alleged nuisance from charcoal pits.

The cases as they came up have been investigated, and we have reason to believe that in some instances litigation has been prevented, and all parties made content. In others the testimony of the Secretary in cases to come before the courts has been promised. It is already quite evident that the advantage to the public of having a central health authority to which appeal can be made in disputed points, is very great.

A case of alleged nuisance is debated in a town until everybody is enlisted on one side or the other, and it is difficult to get an unprejudiced opinion, or at any rate one which will command general confidence. In such dilemma appeal is made to the State Board of Health, who can give, as every one sees, an unbiassed opinion. Their testimony has already quietly settled several such hotly disputed questions.

We desire to call the attention of the Board to the need of an office for the transaction of business. The Sergeant-at-Arms informs us that all the rooms at the State House are already in use. A committee room has been thus far occupied for the meetings of the Board, but even this will be needed for other purposes during the session of the legislature. The business of the Secretary has, up to the present time, been carried on at his private office in his own house, as no other place was available.

In conclusion, it only remains to say that the convenience and usefulness of the Board would be promoted if the legislature should direct that in future our reports should be made returnable to the Governor, and thus appear in printed form at the meeting of the legislature in January, and that they should take their place and be numbered in the Public Document series.

Respectfully submitted.

GEORGE DERBY,
Secretary State Board of Health.

REPORT

ON SLAUGHTERING FOR BOSTON MARKET.

During the past year 53,000 beeves, 342,000 sheep and 144,000 hogs were slaughtered within six miles of Faneuil Hall. While the population within this circle of towns and cities has been every year growing more dense, requiring not only increased supplies of meat, but also, in common justice to all, increased precautions for the maintenance of health, the mode of slaughtering animals has undergone no change. The whole process is carried on in essentially the same way that it was half a century ago, when the population was not a fifth part of what it is to-day and when the influences affecting the health of crowded communities were almost unrecognized, and quite uncared for.

The vacant and waste places where offensive trades established themselves long ago, are now being rapidly filled by a busy population whose need of wholesome air is urgent. We have no room left for nuisances. They cannot exist in our midst without depriving somebody of what he has an inherent right to enjoy.

Practices in themselves objectionable may be permitted where there is plenty of fresh air, while in a crowded population they become offensive and dangerous. Unsewered houses, open privies, pig-pens, heaps of stable manure, may be suffered in the country, because their influence is modified by abundant ventilation ; but in a crowded city, containing fifty or a hundred persons to the acre, they always increase the death-rate, and occasionally nourish a pestilence. The same considerations apply equally to the existing modes of slaughtering animals. The general welfare requires us to guard our populous towns from every form of impurity, to search out the origin of offensive, and particularly of *putrid* odors, and to show, when it is possible to do so, how they may be avoided or prevented.

Great cities everywhere are discovering that the slaughtering of animals may become a prolific and dangerous source of filth. Paris discovered it under Napoleon the First, who applied the remedy. London was slow to reach the same conclusion, but has now followed the example of Paris. New York has recently become convinced that something should be done in the same direction, and the butchers themselves have entered upon the work of purification with zeal, and their complete success is already assured. St. Louis is now demanding a similar reform.

The great population within five miles of the State house, which really constitutes Boston, whatever may be the town and city lines, is still polluted by the foul air which proceeds from modes of slaughtering, and bone-boiling, and fat-melting, which are not only offensive, but old-fashioned, clumsy and wasteful.

The last annual report of the selectmen of the town of Brighton contains the following paragraph: "At certain seasons of the year it is almost impossible, as the slaughtering business is now managed, to prevent offensive smells, especially when found necessary to cast away the heaps of offal that have accumulated, and which, as long as left undisturbed, are prevented from emitting any disagreeable order by the daily use of disinfectants, applied as often as fresh material is added, and where hogs are not allowed to disturb the heaps."

In 1866, when an epidemic of cholera was feared, the selectmen of Brighton employed Dr. Henry G. Clark of Boston to make a sanitary inspection of the town. His report was published, and the following extract refers to the slaughter-houses: "They all, with one exception, were in a condition and conducted in a manner which I consider both disagreeable and dangerous, directly and remotely, to their immediate vicinage, and to public and individual health. The slaughtering being done under cover, the blood, excepting what was saved in casks for sale or transportation, was suffered either to flow down through the floors into a sort of open cellar, or into the grounds immediately adjoining. The entrails and their contents were disposed of in the same way. At all of the slaughter-houses hogs were kept, and fed upon this material, reeking hot, or rotten as it might be by exposure to the sun and air, and to the wallowing of the swine in it. In some of these establishments all this filthiness was aggravated by long accumulation, and by fermentation in stagnant pools of water. The stench about all these places so kept is horrible, and although the day of inspection was a fine dry one, with a free north-west wind blowing, the odor from some of them could be observed for more than half a mile, very strongly."

"The grounds" (near points previously referred to in the report,) "being manured with heaps of the material, the whole neighborhood was infected with its odor." Dr. Clark also says, "Any description of the slaughter-houses must fall short of the perfectly disgusting reality, which can only be wholly appreciated by a personal inspection."

The selectmen in appealing to their townsmen to keep their slaughter-houses as clean as possible, say that "there are those who think it for their pecuniary interest to live, and compel their neighbors to live, in an atmosphere of putrid odors." Also, in another place: "The notion that one town in the vicinity of a great city can be set apart and endowed with a peculiar right to be offensive, is as contrary to common sense as it is to law. The streams which convey the decaying matter, the air which carries the sickening odors, do not stop at boundary lines—and our highways are as open, and as necessary to strangers, as to our townspeople."

This was the condition of the Brighton slaughter-houses in 1866, and they have not improved since that period. They are even more offensive now, because their number has increased, and a larger population is exposed to their influence. There are now about fifty slaughter-houses scattered through the town, none of them of great magnitude, each occupied by a single individual or firm, and each a separate centre of polluted air. The combined effect is familiar to all who pass the Allston Station, on the Albany Railroad, in the summer months, or who drive through the town by the common roads. It is perceptible on the other side of Charles River, in Cambridge, when the wind blows in that direction. *It is entirely due to putrefaction, and chiefly of animal matter.*

The great source of offence in all these establishments consists in the manner of disposing of the parts of the animal used neither for food nor in the arts. In the ox these parts are, the larger portion of the intestines and all of their contents, the "omasum" or third-stomach, the spleen, the lungs, and about half of the blood. In the sheep, the intestines, spleen, stomach and all of the blood. Every slaughter-house has a piggery into which are thrown all these portions of the cattle and sheep. The result is a putrid mass, consisting of blood, which discomposes almost as soon as it falls upon such material, the excrement of the animals killed, and of the hogs, the half digested food contained in the entrails, and the offal itself, covered with decomposing matter. In this filth the hogs wallow. At uncertain intervals it is scraped out and banked up on the ground (often very spongy,) to await a purchaser, or is carted off to be spread upon land. The track of these carts is evident on the roads, both to sight and smell. The fat is carted for long distances in various directions, a portion going to Roxbury, another to Watertown, another to Cambridge and elsewhere. The portion of the blood of cattle which does not go to the hogs is taken away for the sugar refiners, but often not until it has become disgustingly putrid.

The heads and feet are taken to the bone-boilers and gluemakers; the hides to the tanners. This general description of the disposition made of different parts of the slaughtered animals applies to all the towns about Boston where the business is carried on, except Cambridge, which city prohibits the keeping of hogs. The offal is taken from Cambridge to Lexington and elsewhere.

The floors of the slaughter-houses are of wood, and are saturated with blood. In most of them there is no sewerage; generally an imperfect drain leads to some marsh or low piece of ground; sometimes to a brook. The surrounding ground is filled with decomposing matter.

THE SLAUGHTER-HOUSE PIGGERIES

are objectionable on the score of health: *first*, because they produce a questionable if not positively unwholesome kind of pork; *second*, because they poison the air of their neighborhood.

The pig is almost the only quadruped feeding, in whole or in part, on flesh, which civilized man is willing to eat, unless pressed by starvation; among ourselves the only exceptions are the bear and the raccoon, and meat is not the chief food of either of these animals.

The slaughter-house hog not only eats flesh, but flesh in a state of putridity, and is therefore entitled to be regarded as the *carrion beast.* If he is good to eat, so are the crow and the buzzard. Few persons would be willing to eat him if they saw him in his putrid sty, with wreaths of entrails hanging about his neck, and his body smeared with blood. We are not prepared to assert that eating pork fed in this way is productive of any special disease, parasitic or otherwise. It would be very difficult, and perhaps impossible, to prove. Butchers often say that pigs fed on beef offal make good pork, and better than pigs fed on sheep offal. However this may be, we can say with certainty that *human instinct* (which is sometimes better than reason,) *recoils from such food.*

We know that the fat of the carrion beast is soft, and prone to decomposition unless his diet is changed to grain before killing. If the question is asked of any butcher in the market whether the pork he offers for sale is from a slaughter-house pen, the reply will be such as to satisfy the inquirer that such origin is not considered a recommendation.

The second objection to slaughter-house piggeries is of a more positive character. If anything is settled as to the causes of disease it is the influence of decomposing organic matter in giving rise to diarrhœal affections, and typhoid fever, in depressing the vitality of children, thus rendering them less capable of resisting disease in every form, and in making all the epidemics more active and virulent. The slaughter-house pig-pens are filled with putrid animal matter, with rotting blood mingled with excrement, and are *therefore a source of danger to public health.*

In making this statement we do not overlook the fact that Brighton, where most of the slaughtering is done and in the manner described, has not been, up to the present time, an unhealthy town.* This apparent contradiction of a general law whose truth has been proved all over the civilized world, is capable, we think, of explanation.

---

* The death-rate of Brighton in 1865 and 1866 was a little less than that of the whole State; in 1867 it corresponded with that of the whole State.

While these pages are passing through the press, we have learned the mortality of Brighton for 1868 and 1869, and have received an estimate of the population in those years from the Selectmen. Assuming the number of people to have increased 500 since the census of 1865, the death-rate of Brighton in 1868 was 22, and, in 1869, 27 in a thousand. These rates are as high as in the crowded wards of Boston, higher than in any one of the nineteen most populous cities and towns in the last published report, and are not equalled by any town of corresponding size in the Commonwealth.

The town of Brighton is three miles long and a mile and a quarter wide, and contained in 1865 less than 4,000 people. Its natural sanitary advantages are very great. Its soil is for the most part dry, its surface is broken by hills of considerable height, and it is drained on its whole northern and eastern side by Charles River. The occupations of its people oblige them to *work in the open air.* They are butchers, farmers and market-gardeners. There are no shoe factories, or other industrial establishments requiring numbers of persons of either sex to work in doors.

There is also general thrift, industry and prosperity, which, in themselves, always tend to make a people healthy. Scattered over the whole territory are about fifty slaughter-houses. It is evident on looking at these establishments with reference to the position of the dwellings, that no one will live near a slaughter-house if he can help it.

Each slaughter-house, with its associated pig-pen, is isolated, and exposed to the freest possible ventilation, both without and within. The foul air to which these places give origin is not breathed until it has freely mingled with air which is pure.

The absence of excessive mortality in Brighton up to the present time, is due, in our opinion: 1st, to the almost exclusive *out of door occupations* of its people; 2d, to its healthful site; 3d, to the separation and abundant ventilation of each of its many nuisances; and 4th, to the possession, by its people generally, of the means of procuring all the comforts of life.

The happy exemption from serious disease to which we have referred *cannot continue* if ventilation is obstructed by a dense population. As soon as people are compelled to live in large numbers in the vicinity of rotting organic matter it cannot fail to produce its legitimate and well-recognized effect.

The future character of this beautiful township, possessing rare advantages for the establishment of healthful and pleasant homes for a hundred thousand people, must depend upon the manner in which its chief business is conducted. Tainted air will finally attract a tainted population, while a reform of its slaughter-houses, which is both practicable and safe, will not only insure the *future* health of Brighton, but greatly increase the value of its territory.

Fat-Melting and Bone-Boiling.

The fat and tallow and heads from the various slaughter-houses around Boston are carried to the melting and bone-boiling establishments. They also receive a large portion of the feet of the animals, and the fat, and odds and ends from provision stores, also very lean and unsalable meat from the markets. Some of them receive dead animals. These various portions are separated according to their fat-rendering value.

This material is carried about the neighborhood of Boston, and is finally delivered, in Boston proper, in Cambridge, Charlestown, Brighton, Roxbury and other towns. Here it is boiled in open vats, and emits a most offensive odor. Sometimes an attempt is made to carry off the vapors by a high chimney, but even in this case the lids of the vats are of wood, and the foul smell freely escapes.

The effect of boiling is to drive off the watery portions, leaving in the vats tallow, lard, oil, or grease, according to the materials employed; also bones, and the scrap or "greaves."

The bones are shipped to New York or sent to East Boston to be ground and used, for the most part, as fertilizers. The scrap is generally pressed into cakes to be used for feeding hogs or poultry, and sometimes is used as manure. At one of the largest of these establishments the scrap, dipped out of the vats, is spread in layers like fish-flakes and dried by a furnace. The odor in the building where this drying process is carried on is insupportable, and the general stench from the premises is such as to be perceptible several hundred yards from the entrance. And this in a part of Boston filled with a crowded population.

Disposition made of Dead Horses, Cattle, Sheep, Pigs, Dogs and Condemned Meat.

In a population as large as that of Boston and its immediate vicinity, the amount of dead material of the description above referred to is very great, and it becomes every year more important that it should be disposed of in an orderly, cleanly and healthful manner. Dead horses from the streets and stables of Boston proper, are now carried through South Boston and shipped from the "Point" to Spectacle Island. Fifteen to twenty a week are here boiled in open vats, emitting a horrible stench, which is carried by the wind over the inner harbor and adjacent islands. Pigs have been kept at this place in large numbers, but on a recent visit we found only two. The place is disgusting, and filthy in the extreme.

Dead cattle and sheep and pigs, from the railroad trains, are bought by the various bone-boiling establishments in the neighborhood of Boston and "rendered" in the manner described. Some of them also receive horses. Many of the animals are putrid before a bargain is made for their removal. Dogs and cats for the most part get into the docks, or are thrown into the ash carts and go to make up the filling of new land.

THE REMEDIES

for the evils to which we have called attention, may be thus expressed in their simplest form :—

1st. The prevention of putrefaction.

2d. The conversion of the offensive vapors resulting from boiling, into inodorous and harmless gases.

Everything connected with the business of slaughtering can, in one of these two ways, be disposed of, except the manure made by the animals, which need be no more offensive than in a well-kept stable.

To accomplish all this it is necessary,—

1st. To give up the practice of feeding the offal to hogs.

2d. To build abattoirs and melting houses within the same enclosure.

Not a single step can be made in the improvement of existing modes of slaughtering without giving up the practice of feeding the offal to hogs ; with them, reform is hopeless.

It is not necessary to go to either Paris or London to see an abattoir on a very extensive plan. The "Butchers Hide and Melting Association" of New York have one in successful operation at the foot of 44th and 45th streets, East River. They never fed the offal to hogs in the city of New York, but every other imaginable form of nuisance had grown up about the slaughter-houses which existed there five years ago. Now all is changed, and the business is conducted in an orderly, cleanly and healthful manner, giving no offence whatever to the surrounding population, and as we were informed on the spot, with increased economy, profit, and satisfaction to the butchers themselves. There are twenty-nine bulks or compartments within the immense structure to which we have referred, each of which is occupied by a separate butchering firm who have complete control of their premises. The "terms" to butchers using this abattoir or any other of the recently improved slaughter-houses in New York, are now fixed, and consist simply of *the feet and legs of the cattle from the knee down, with the skin on.* These are sold by the proprietors to the manufacturers of glue and Prussian blue for eleven cents a piece, or forty-four cents for a set of four. This pays a good profit upon investment for buildings and appliances, and all parties are satisfied.

Every portion of the animals liable to become putrid or offensive is removed before decomposition can attack it, even in the warmest weather, and this is done in an orderly and methodical way.

Melting vats are under the same roof. The vapors from these vats are condensed in the East River, and there is no offensive odor whatsoever. Nothing is wasted, and everything is made to bring the highest price by the saving of the cost of transportation. The only thing needed in this establishment to make it complete is a vat for "rendering" offal. This is now carted across the city before decomposition can attack it, to the "rendering dock" at the foot of 38th street, North River, where it is dumped directly into vats which are then hermetically closed except for the escape of the vapors and noxious gases, which pass through coils of iron pipe intensely heated by a furnace. These vapors are finally mingled with a certain proportion of air, by an arrangement similar to an argand burner, and are conducted into the flame of the furnace where they are consumed. There are received annually in the vats of this establishment 4,000 dead horses, many hundreds of dead cattle and sheep, 5,000 dogs and cats, 125,000 pounds of condemned meat, and *those parts of the slaughtered animals which at Brighton go to the hogs*, from every slaughter-house in the city of New York.

This material is "rendered" into tallow, grease, bone and scrap, without the slightest odor proceeding from the vats during the process. The scrap and bones are removed in barges to be used as fertilizers.

By either of these processes, the condensation of the vapors by cold water, or the destruction by fire, every tallow-rendering and bone-boiling establishment can be made perfectly inoffensive.

THE VALUE OF BLOOD.

The reform of any social evil may be greatly hastened if it can be shown that it does not involve pecuniary loss. Whoever attempts to reform our modes of slaughtering animals must be prepared to meet the universal statement among the butchers that hogs fed upon blood and offal are a source of profit. *We cannot deny it*, while at the same time asserting that, as a source of danger to public health, the practice ought to be given up. But we also believe that *the loss of the value of blood* involved in the present system is enough to nearly, and perhaps quite, compensate for the gain in hog keeping.*

The blood of slaughtered sheep and hogs is now entirely lost. No attempt is made to save it, and it is left to putrefy in the pens. The blood of cattle killed at Brighton is scattered over its many slaughter-houses, and is regarded as of so little value that the portion saved is sold by the butchers for anything they can get. Some of them say that they are glad to be rid of it at any price, because it so quickly becomes offensive. *The blood of Brighton does not bring to the butchers more than a cent a gallon*, reckoning one season with another. On the other hand, at the largest slaughter-house in New York, and a very fine one, although not equal to the one just described, the proprietor informed us that he sold the blood of 30,000 cattle killed last year for $5,000 cash, which was enough to pay *the interest on the cost of his establishment*, and that he expected to get a good deal more in future.

The value of blood consists chiefly in its serum or watery part, which separates from the clot on coagulation; and the value of this portion depends upon its containing *albumen*. Sugar refiners use the fresh blood because it is cheaper and the color is not objectionable, but calico printers and photographers require it to be colorless and therefore use either egg albumen, or blood albumen from which the red clot has been carefully separated. From these two sources, egg and blood, comes all the albumen used in the arts. Albumen constitutes seven per cent. of the whole mass of the blood, and is readily prepared from the serum, by simple evaporation, without the addition of any other material. The process is fully described in a report made to the "Societe Industrielle" de "Mulhouse" April 28, 1869, a translation of which is furnished in the Appendix.

---

* This gain is not as great as might at first appear, since a good deal of the offal now thrown into the pens is only partially stripped of its fat; under a better system *all* this fat would go with the tallow.

Solid blood albumen, the result of the evaporation, is a dry, brittle, translucent material, resembling horn, or fragments of glue. This, when dissolved in water, resumes its primitive consistence.

Blood albumen in this form is imported from France, and costs at present $1.20, gold, per pound. Our cloth printing establishments use it very extensively. It is also used by sugar refiners, and if the production should be increased, it would, for every purpose, take the place of fresh blood. At one of the largest sugar refineries in this vicinity, the supply of blood from Brighton has been found to be so uncertain and unsatisfactory (often putrid and offensive*) that the imported dry albumen has entirely taken its place. In addition to this real "blood albumen," there is another dry black material imported at a much cheaper price which is used also by the sugar refiners. This is evidently *dried blood*, with all the coloring matter retained.

Of these two articles, there passed through the Boston custom-house in 1869, 10,346 pounds of blood albumen, and 6,234 pounds of dried blood.

The amount brought into the port of New York† we have been unable to ascertain, but it was probably very much larger.

The calico printers use, it is estimated, from 8,000 to 12,000 pounds of blood albumen per annum, and the consumption for their purposes is rapidly increasing and promises to continue. If the article should be manufactured in such close connection with slaughter-houses as to preserve the clearness of color it would take the place of egg albumen for every purpose. The use for refining sugar would be very great even if the blood were simply dried, without attempting to separate the clot from the serum. These are doubtless the chief uses of blood albumen, but there are many other arts in which it is essential in small amounts. The market is extensive, the demand is increasing, and the price is such that the blood of an ox (according to French experience*) is worth $1.05 gold, when separated from its clot and coloring matter, and dried. Even with the fresh blood allowed to run into vats, as in New York, $5,000 divided among 30,000 cattle gives 16⅔ cents for each animal, which is five times as much as the Brighton butchers receive.

---

* From this cause the city of Cambridge does not permit the carts carrying blood to pass through its streets.

† Egg albumen and blood albumen are not distinguished on the books of the New York custom house.

So much for the *serum* of blood. But there is another element of value in its *fibrine*, or the portion which coagulates, holding the red globules in its meshes.

This is a fertilizer of the most powerful kind. We have the highest chemical authority for saying that this when dried is worth more than Peruvian guano. A company is now preparing it for this purpose at the Communipaw slaughter-houses near New York, without separating the serum. It certainly is practicable to make both the serum and fibrine available. After the separation of the serum on coagulation, the clot might be mixed with dried earth or clay, or dried peat or gas lime (holding carbolic acid) or some similar material, and rapidly dried before decomposition could reach it.

We have endeavored to show that blood, under our present system (or rather want of system) is a source of filth and a source of waste—that it has a value much greater than has been generally supposed, and greater now than ever before—that the interests of health and economy combine to make it important to save it from putrefication, and to utilize it. But this can only be done to advantage in large establishments, and by dealing with large amounts.

To complete the reform in modes of slaughtering in the vicinity of Boston in such a way that nobody shall suffer and everybody shall gain, there are needed one or more "*Abattoirs*," containing all the improvements which European experience can furnish, or modern science suggest. They need not be expensive buildings, although they should occupy a large space. They should have comfortable stables for protecting and feeding the animals. As regards the slaughter-house itself, the essential things seem to be,—

---

* See Appendix.

1st. A pavement of stone or of some material impervious to blood.

2d. An abundant supply of water.

3d. Complete drainage and sewerage.

4th. Vats for the "rendering" of fat and offal on the spot, before putrefaction can attack them.

5th. The means of converting blood into blood albumen.

If disinfection of "offal scrap" should be necessary at any season it could be done by means of *earth dried in the sun*, with perhaps the mixture of a little fresh lime, thus increasing its value as a fertilizer.

The *sanitary* advantages of such a system would be,—

1st. The removal of the present offensive odor, which, as population becomes more dense, must affect public health.

2d. The removal of slaughter-house pork from the markets.

3d. The ready inspection of meat, thus insuring the rejection of that which is unfit for food.

The *economical* advantages would be,—

1st. Diminished liability of having meat "spoiled" by exposure to the emanations from the putrid pig-pens.

2d. The value of the blood which would be saved and utilized.

3d. The savings which must always accompany order, system, the division of labor, the avoidance of transportation, and the doing any business on a large scale.

4th. The greatly increased value of land in the vicinity of the present slaughter-houses.

The preceding considerations, together with the appended documents throwing additional light on the whole subject, are respectfully submitted to the legislature and to the people of the State, in the hope that they will hasten the day, which is sure to come, when the present offence will be removed.

APPENDIX TO REPORT ON SLAUGHTERING.

BLOOD-ALBUMEN—ITS VALUE AND MODE OF PRODUCTION.

[Translation.]

Extracts from a Report to the Chemical Committee of the "Societé Industrielle" of Mulhouse, France, by M. Charles Dollfus-Galline, April 28, 1869. *(Bulletin de la Societé Industrielle de Mulhouse April et May*, 1869.*)*

The high price now demanded for both egg and blood albumen has induced the chemical committee to examine into the causes of their enhanced value, in order that some remedy should if possible be applied, to prevent the disturbance which is threatened from this cause to the business of cloth printing. It is evident that the production of blood-albumen is not equal to the demand, especially since the English and American manufacturers have commenced making goods of a certain description ("*faux teint*") which require the use of albumen, and which until recently have been almost exclusively made in France.

We have thought that the best means to prevent this constant increase in the price of albumen would be to stimulate in every possible way the production of blood-albumen, since we believe that in many localities the blood is lost. Up to the present time Austria and France have furnished their share of the whole amount required, but Russia, North Germany, and even England, have not done their part. Your Commission believe that, in this view of the case, they cannot do a better service than to encourage the makers of albumen in all countries by explaining the process of extracting albumen from blood, a proceeding quite simple when the details are understood. In the first place we will explain the principles involved in the separation of albumen from the coloring matter of blood, and then describe the necessary apparatus and the manner of using it. Lastly we will enumerate the apparatus sufficient for the manufacture of 40 kilogrammes (88⅕ pounds) of dry blood-albumen per day.

Blood is a red, alkaline liquid, which, as every one knows, becomes a gelatinous mass by cooling soon after it has flowed from the arteries and veins. The chief constituents of blood are, water, fibrine, albumen and colored globules which, when the blood is circulating, swim in the fibrine and albumen. As soon as the blood cools the fibrine coagulates, forming a kind of net-work which encloses the colored globules in its meshes. The more the blood cools, the more the net-work contracts, and pretty soon you see a clear fluid exuding from its meshes. This fluid is *serum*, and the object of the manufacturer of albumen is *to collect this clear fluid and dry it.*

The following are the means practically employed. When the animal is knocked down and his throat cut, the blood flows in a large stream, and should be received in zinc vessels of the following dimensions: Diameter 0.38 ($14\frac{9}{10}$ inches) ; depth 0.10 ($3\frac{9}{10}$ inches.) These "receivers" hold about 8 litres ($1\frac{3}{4}$ gals.) of blood, and two or three must be used to obtain all the blood of an ox. As soon as the blood is received it should be taken to a place where the air is as fresh as possible, but only a few yards distant from the spot where the animal is struck, and here it must remain until it has coagulated. It is important that the blood should not be carried far while it is warm, as otherwise the red globules will mix with the serum and will give it a reddish color. When the blood has coagulated, which will be in from half an hour to an hour and a half or even two hours, according to the temperature of the air, it can then be taken, without risk, a distance of several hundred yards, but this must be done in the same vessel in which it has coagulated.

When the blood has perfectly coagulated, a condition which is recognized by the gelatinous mass being covered with liquid globules almost free from color except perhaps a light tint of greenish yellow, the clot is to be transferred to another vessel, called the "sieve." The form of this vessel is similar to the one in which the blood was originally received. The diameter 0.38 ($14\frac{9}{10}$ inches,) the depth 0.06 ($3\frac{3}{10}$ inches,) but the bottom is pierced with little holes 0.004^{mm} (.00015 of an inch) in diameter, with spaces between them measuring about $0.02\frac{1}{2}^{cm}$ (.009 of an inch.) The gelatinous mass is then cut in cubes of 2^{cm} (0.78 of an inch) and the "sieve" is placed upon a third vessel which we call the "syphon." This third vessel is of the same dimensions as the receiver and only differs from it in having a hole in its bottom fitted with a good sized cork. The cork is traversed by a zinc tube 0.20^{cm} ($7\frac{8}{10}$ inches) long, which can readily slip up and down through the cork. The object of this arrangement is to draw the fluid from the top instead of the bottom of the vessel. When the "sieve" is placed above the syphon the first drops of serum which flow are highly colored, but very soon the redness disappears and the liquid which strains through the holes of the sieve is nearly clear. In twenty-four hours all the albumen which this operation can furnish is extracted. The clot which is left is a dark red, gelatinous solid. The serum or solution of albumen, which flows through the syphon is limpid, slightly tinged with yellow. The first red drops remain in the lower part of the vessel undisturbed by the action of the zinc tube.

There are thus obtained two liquids, of which one furnishes, by drying, albumen almost colorless, the other a darker albumen, but which may also be used in the printing of the darker shades. Before removing these liquids to the drying house they should be left for twenty-four hours to settle in large vessels of earthenware furnished with a cock 15^{cm} ($5\frac{9}{10}$ inches) from the bottom. In this way they become clear, and furnish albumen which is quite transparent.

Such are the methods employed to produce an almost colorless albumen from blood. We believe that they are susceptible of great improvement; in fact we are far from getting in this way all the albumen which blood contains. The analysis of M. Nasse shows us that 1,000 kilogrammes of blood contain 67 kilogrammes of albumen, while by the process we have described there are obtained only 25 kilogrammes. The following results are from experiments made upon several hundred cattle. An ox or cow furnishes an average of 18 litres ($3\frac{9}{10}$ gallons) of blood, yielding 4 litres ($\frac{88}{100}$ of a gallon) of serum. Ten litres ($2\frac{2}{10}$ gallons) of serum are required to make a kilogramme ($2\frac{2}{10}$ pounds) of dry albumen. The blood of $2\frac{1}{2}$ beeves is therefore necessary to make one kilogramme of albumen. The blood-albumen of commerce comes from cattle. We do not think that as yet the blood of sheep or of calves has been used for this purpose. The albumen of these animals has all the qualities of that from beeves. The albumen from sheep's blood is even preferable, since it thickens more.

The blood of 10 sheep or of 17 calves is necessary to furnish one kilogramme of dry albumen.

The serum from the blood of sheep is as rich in albumen as the blood of beeves; 10 kilogrammes of this serum furnish by drying one kilogramme of albumen. Calves do not give as much; 10 kilogrammes of their blood make 0.82 of a kilogramme of albumen.

We have reason to believe that the blood of pigs would give excellent results. In France their blood is too valuable to be used for extracting albumen, but in the United States where pigs are killed in enormous numbers their blood could be used for this purpose to advantage.

To make 40 kilogrammes of dry albumen per day (requiring the slaughter of 100 beeves) there are required 150 "receivers," 300 "sieves," 300 "syphons," 8 large earthenware vases, and 1,100 plates, in which to dry the serum. These plates must not be too large. Those referred to are $0^{\text{m}}.300$ ($11\frac{8}{10}$ inches) by $0^{\text{m}}.250$ ($9\frac{8}{10}$ inches) and $0^{\text{m}}.03$ ($1\frac{1}{10}$ inches) in depth.

The following extracts from the journal of a member of the Board, written during a tour in Europe in 1867, are presented as furnishing a description of the most recent slaughtering establishments in France:—

"Paris, Sept. 21, 1867.—We determined to visit the Abattoir of Paris recently erected in imperial grandeur by order of Napoleon III. Never was a great idea carried out more thoroughly and on perfectly scientific, humane and hygienic rules. It covers a space of about 150 acres just outside of old Paris, but within the modern limits, which like those of London, now include many smaller towns that had grown up around the ancient *Lutetia.* It is at La Villette. There all the flesh meat eaten in Paris is slaughtered and prepared for the market. One hundred and fifty master-butchers and nine hundred apprentices are at work most of the time. The slaughter-houses, some thirty in number, are made of brick, with stone floors, and each is arranged with neat stables immediately adjacent, where the animals can be kept and fed. The houses are long and two stories in height, arranged with streets, straight, broad and clean, between them, like those of a small model village. All the surroundings, as well as the interiors of the buildings, are kept scrupulously neat, and all refuse matter is immediately carried off fifteen or twenty leagues from the city by means of a canal which runs through the entire territory. In this way and by great care, the place, instead of throwing out an offensive odor, as the establishments at Brighton, for example, are perfectly pure.

"A visitor could be in attendance all day without having his nostrils once offended as they are always at Brighton.

"Each master-butcher can bring his animals, and on being inspected and found healthy, they can be slaughtered by him on payment of certain charges. Inspection is made before killing, and again before the meat is carried off to market. About 2,500 oxen, 2,500 calves and 30,000 sheep, are slaughtered every week.

"The *administration* consists of: 1st, custom-house officers for the entry of the animals; 2d, police to take care of the animals; and 3d, employés to take care of the whole establishment. Besides these there are inspectors, whose duty is to examine animals before and after killing.

"The establishment was opened January, 1867. Everything offensive is used up in a scientific way, so that everything valuable is saved, and nothing taints the air.

" An excellent oil for machinery is extracted from the feet of the sheep. The fresh blood is converted into a dry and inoffensive form of "*albumen*," used for refining sugar, and for other purposes in the arts.

"On the side of the canal opposite to that on which stands this village (so to speak) of slaughter-houses, appears a magnificent and lofty 'crystal palace' of iron and glass, intended for the keeping of large herds of cattle when first brought to be sold to the master-butchers. It is of matchless beauty because so lofty and airy-looking, and yet is admirably fitted for keeping securely in a healthy state large droves of animals.

"I think meat of animals thus kept must be more likely to be healthy than it would be after long exposure to heat or cold, and after being half trampled to death in consequence of close crowding, as in our cars from the West, and finally after being tumbled out into miserable open pens as at Brighton.

" The mode of slaughtering too is much less brutal than with us. The animals are quietly led in blindfolded, and are not aware of any trouble impending until the fatal blow is struck."

REPORT

ON THE SALE OF POISONS.

This subject appears to the State Board of Health to be worthy of renewed attention on the part of the legislature. The protection of public health from the mistakes made by those who deal in dangerous drugs seems to require additional security, if it can be accomplished without infringing upon private rights.

The Board has endeavored to collect evidence of injuries to life and health which have been caused by the mistakes of druggists within a given period, but this they find impracticable. A small proportion of such cases come before the courts, or are put in such form that they can be cited as affording conclusive proof, yet it is within the knowledge of almost every citizen that such unhappy mistakes frequently occur, that they sometimes cause death, and that they often result in serious injury to health. The existing law relating to the sale of poison reads as follows:—

> "If any apothecary or other person sells any arsenic, strychnine, corrosive sublimate, or prussic acid, without the written prescription of a physician, he shall keep a record of the date of such sale, the article, the amount thereof sold, and the person or persons to whom delivered; and for each neglect he shall forfeit a sum not exceeding fifty dollars. Whoever purchases deadly poisons, as aforesaid, and gives a false or fictitious name to the apothecary or other person, shall be punished by fine not exceeding fifty dollars."

This law seeks to restrain both seller and purchaser of the four dangerous articles named, but practically it is very little regarded. In our examination of the whole subject with reference to the protection of the lives of the people, we have endeavored to find all the disadvantages as well as the advantages which might attend additional legislation on this important subject.

The objections to interference may be thus stated,—

1. Every one desires to buy and sell whatever he chooses with as little hindrance as possible.

2. There is a difficulty in defining poisons, in drawing a line on the one side of which shall be placed those substances which are dangerous, and on the other those which are harmless. It is often a question of quantity. Some articles in daily use will destroy life if enough be taken.

3. Some very deadly poisons are extensively used in the arts.

4. No law may be able to prevent those who desire to kill themselves from obtaining poison for the purpose, since they do not dread the evidence which post-mortem appearances may reveal. These are among the objections which may be offered to additional legislation. But we think there are considerations of greater weight which would justify the legislature in interposing their authority.

Within the past twenty years great changes have taken place both in the materials used as drugs, and in the manner of selling them. The progress of chemistry and of pharmacy has added greatly to the number of medicinal preparations. While the list of articles has at least doubled, their bulk has diminished and their power has increased. Every year adds to the number of medicines of concentrated strength, each of which if taken in small amount will kill a man, and all of which apothecaries are expected to keep ready for use. While this change has been going on, requiring increased care and knowledge on the part of those who deal with such two-edged weapons, the business of the apothecary has from various causes changed also.

People do not take as many drugs as formerly. Physicians do not prescribe such variously compounded mixtures. Twenty years ago a druggist was more exclusively devoted to his legitimate business, while now, in our large towns, he is rather a dealer in soda water, cigars, perfumery and fancy goods.* His

---

* The following advertisement is taken from a Boston newspaper of Dec. 21, 1869:—

For Sale.—The well-known Drug Store at the junction of Court and Hanover Streets. This is a splendid opportunity for one or two live men to secure the most profit-chief interest does not, in many cases at least, correspond with his duty to the community as a dealer in articles which, through a want of prudence or knowledge on the part of himself or his assistants, may carry death into any family.

The most poisonous preparations may be often found in druggist stores in dangerous proximity to articles in daily use, and both are liable to be dispensed by boys who are completely ignorant of their properties.

Our best apothecaries lament this condition of the business to which their lives are devoted. They know that their position is one of responsibility, entitled to the honor and confidence of the community, but in spite of their efforts they find themselves more or less involved in the discredit which has fallen upon their vocation. They are ready to welcome any change whose effect will be to "magnify their office."

In seeking for a remedy through legislation for the evils to which we have referred, it seems to us that although the present law relative to the sale of poisons is of little value for the protection of the health and lives of the citizens, it would nevertheless be useless to multiply restrictions upon the sale of individual articles. It is doubtful whether a list *could* be prepared which would include all dangerous drugs. We think, moreover it would be unwise, to restrict either the physician, or the dealer exclusively by wholesale, in any way. But as regards the retailer of drugs and medicines we believe a remedy more or less complete for existing evils would be found in the requirement of *a certain amount of instruction and special training before he should be permitted to exercise his calling*. The precise way in which this should be accomplished seems of less importance than that the principle should be established that a business of such usefulness and responsibility, as well as of such danger, to the public health, should be both protected and honored. We respectfully commend this subject to the attention of the legislature.

Every year lives are lost by people taking the wrong medicine. Some of these lives we think might be saved by requiring apothecaries to distinguish between medicines for external

able store in the State. A knowledge of the drug business not necessary, as the trade is principally fancy goods, patent medicines, cigars and soda water. Profits on soda sales alone more than pay the running expenses. Apply at the store between 2 and 6 P. M.

and internal use by putting them in bottles of a different shape or with labels of a different color. Very dangerous drugs might be marked, as they are in France, with a skull and crossbones, or the word "poison" be placed above the number of the recipe or the druggist's name.

In considering the various dangers to which public health is exposed from the use of poisonous drugs it should also be said that physicians are often blameworthy through the obscurity of their prescriptions,—written for the most part in abbreviated Latin, often in haste, by imperfect light, and upon any accessible scrap of paper, they may sometimes puzzle the most skilful druggist. Legislation cannot directly remedy this evil, but we believe that if the education of the physician and the druggist were brought under the same general supervision, each would better understand the other, and both would more intelligently coöperate for the relief of human suffering.

THE PREVENTION OF DISEASE.

By GEORGE DERBY, M. D.,

SECRETARY OF THE MASSACHUSETTS STATE BOARD OF HEALTH, LECTURER ON HYGIENE IN HARVARD UNIVERSITY, SURGEON TO THE BOSTON CITY HOSPITAL.

[The following observations include some remarks made at a meeting of the Boston Social Science Association, Dec. 3, 1868. They appear in this form at the request of the State Board of Health.]

Are diseases preventable? Are their causes so far understood that we are justified in saying that they may be avoided? Or are they mysterious, a part of the plan of creation, and not to be averted by human foresight?

The history of medicine shows that until recent times the most destructive diseases have been practically regarded as quite beyond the power of man to prevent. Plague and pestilence have been thought to be providential, and only to be averted by the prayers of the church. It is true that the great fathers of medicine left behind them rules for the maintenance of health which have had a certain currency in the world. They were but glimpses of what is now known as sanitary economy, but not being founded upon demonstrable truth, they fell to the ground.

In the oscillations of medical opinion at the present time, the pendulum swings first in one direction and then in the other over the immutable truths of physical, chemical and pathological science, each day bringing us nearer to a just appreciation of the wonderful processes which give rise to the various phenomena of health and disease.

Now, the brilliant generalizations of some chemical philosopher almost lead us to believe that the mysteries of vital action are revealed through the laboratory; or even by the microscope we seem to be peering into the human laboratory itself, and reading, as in an open book, secrets which have been concealed since the creation. But patient and careful students of disease follow up these revelations, and clearly show that so complex a machine as the human body cannot yet be regarded as a piece of inanimate material. Meanwhile, the sum of clear, and connected and practical knowledge of vital processes is constantly and rapidly increasing.

In the prevailing discredit of drugs as weapons for attacking and driving out disease, there are wise and good men whose enthusiasm in the idea of the self-limited and inevitable character of the most destructive diseases when once established, leads to the encouragement of a kind of fatalism. They would persuade us that the causes of epidemics are unknown, that contention with them is vain, and that the best we can do is to prepare for an easy death by cholera, or fever, or whatever else Providence may send, and be thankful it is no worse.

It is almost a repetition of the dogma of necessity and predestination so familiar to our fathers. But there is another side to the question. Freewill is as applicable to the physical as the moral man. We have only to open our eyes to the demonstrations of these latter days to be assured that immunity from some of the most destructive diseases is within our power; not perhaps within our individual power, but that they are capable of control, limitation, extinction even, by associated effort.

Such demonstrations as those to which we have referred were not possible until the system of registration of population and of mortal diseases became a part of the established law of civilized communities. Political economists and statesmen had seen the waste of life, and philanthropists had seen the suffering, but in the absence of vital statistics no one could prove what many intelligent minds perceived. At the present day we stand face to face with facts of the deepest interest, showing the comparative duration of life in different communities, the causes of deaths, the influences of soil, of climate, of race, of inheritance, of occupation, of contagion, of putridity.

Hand in hand with these significant facts the sciences advance. Tyndall, and Liebig, and Haughton, and Pasteur, and Jeffries Wyman, and a host of earnest seekers after truth, wherever it may lead, carry forward, day by day, the actual boundaries of pure and exact science ; till we seem to be entering on a field of knowledge which Benjamin Franklin may have dreamed of, but certainly never described in his various foreshadowings of the possibilities of the future.

And what are these demonstrations with regard to disease which it concerns us to know ? They are the putting together in the relation of cause and effect of certain established facts,—*the conditions under which people live, and the diseases associated with such conditions.*

It has been the reproach of medicine that it is inexact ; that its rules of practice are conflicting ; that doctors disagree. This may be accounted for by the intricacy of the problems they are called upon to solve, by the complexity of the human mechanism. This uncertainty diminishes as science advances ; but it may be claimed to-day, for one of the departments of medicine, *public hygiene*, or, as it is sometimes called, the *medicine of the State*, that by the grouping together of great numbers of cases, by which process errors are extinguished and the truth made manifest, we are brought into such relations with disease that its teachings are almost entitled to be regarded as fixed, conclusive, final and exact.

Look, for instance, at the connection between typhus and typhoid fever, and the decomposition of organic substances. One of the accepted modern names for this disease is pythogenic fever, or fever born of putridity—this being its distinctly proved external cause. That an obscure internal cause, which in our real ignorance of its nature is called a proneness or disposition to receive the poison, is necessary for its development does not affect the truth of the fact that without filth the disease is not born. The evidence connecting this disease and all its kindred with uncleanness and putridity, decomposing matter, and particularly the excrement of the bodies of men and animals, conveyed to the human system by air and by water, is given in great detail in the English government reports of the past fifteen years, and cannot fail to convince any one who will examine them without prejudice. The whole train of so-called zymotic diseases, or diseases whose course suggests the idea of a morbid ferment, are of the same class.

The plagues and pestilences of the middle ages, which sometimes swept away one-third of the inhabitants of Europe, are examples of the virulence of such diseases when people were huddled together in great towns, without drains or sewers, or any provision for the removal of human excrement and the foul matters which proceed from the various processes of society. As civilization advanced these pests declined; but even as late as the days of Hogarth, who has made us familiar with the foul appearance of the streets of London in his time, the rate of mortality is known from the history of the Tontine insurance scheme to have been vastly greater than at the present day. We are now able, through the registration reports, to mark with perfect accuracy the improvement in the duration of life throughout Great Britain. As improved works of sewerage and water supply go into operation in certain districts, the death-rate falls. As the foul alleys of Liverpool are cleared up, and the poor who had lived in cellars are brought to the light of day, the death-rate falls. And so it is everywhere. The improvement of public health, as expressed by that unerring guide, the death-rate, corresponds with all the means by which air and water are kept free from pollution.

If there is any one disease which more than another would seem to favor the views of the advocates of the predestined and the inevitable, it is that terrible scourge, far more to be dreaded than cholera, *consumption*. It has been regarded as a special mode intended by Providence, to reduce a redundant population, as feeble trees in a forest are crowded out of existence by their more vigorous neighbors. And there is much in the history of the disease which makes such arguments plausible. It is found everywhere in civilized communities. In the South as well as the North; seeming to be generally distributed. Yet the kind of investigation of its natural history and of its causes which we are able to make in these latter days, through the aid of vital statistics, and by the comparison of great numbers of cases, shows that this is far from being true, and places us directly upon the path leading to a discovery of the conditions under which it originates, conditions which when fully recognized may be avoided. That its causes are many is certain; that some of them are obscure, and even quite unknown as yet, is very probable. But others are fully revealed, and are influencing practice and saving life. One of them is thus stated by Mr. Simon, medical officer of the English Privy Council, and is abundantly proved by him. "In proportion as the people of a district are attracted to any collective in-door occupation, in such proportion, other things being equal, the district death-rate by lung diseases will be increased."

An examination of the deaths from consumption in Massachusetts* during ten years (45,000 cases,) shows that its distribution in the various towns is very unequal, in some of them the mortality from this disease being two and even three times the number found in others of equal size, and equally stationary population, representing all ages.

Dr. Bowditch of Boston, has clearly shown that among the prominent causes of consumption is exposure to *soil moisture.* This conclusion is derived from a careful comparison of statistics furnished by physicians in all parts of Massachusetts, and is a result of such comparison exclusively. There were no preconceived ideas, and no previous suspicion was entertained of the existence of any such law. A singular confirmation of its correctness has recently come from England. In 1865 and 1866 inquiries were made, under government authority, into the effect of drainage works and other sanitary regulations designed to promote the public health. In pursuance of this inquiry, twenty-four towns were selected in which improved drainage had been established. It appeared that, while the general death-rate had greatly diminished, it was most strikingly evident in the smaller number of deaths from consumption. In commenting upon this fact, the chief medical officer reports that "the novel and most important conclusion suggests itself that the drying of soil, which has in most cases accompanied the laying of main sewers in the improved towns, has led to the diminution, more or less considerable, of phthisis."

It has since appeared that the English physicians were entirely ignorant of the observations previously made on this side of the water by Dr. Bowditch, to whom of course the credit belongs of first disclosing this hidden source of danger.

These are the kind of discoveries which advance rational medicine, and prolong life. Not evolved from anybody's internal consciousness, which is good for nothing in the healing art, but deduced from observation. We do not readily see at the first glance how immensely important they are, nor do we always note, in the constant fresh recognition of the causes of disease, and the means of their prevention, our real rate of progress.

---

* Massachusetts Registration Report, 1865.

Everybody sees to-day that of two families inheriting a consumptive tendency, if one takes to making shoes in an ill-ventilated shop, and the other goes a lumbering in Wisconsin, the latter will live the longest. But our grandfathers did not know even that. They protected such persons from fresh air, fearing they would take cold, coddled them, nourished them imperfectly, and gave them medicine.

In the light of Dr. Bowditch's new law we now know in addition that they must not live on wet soil.

There is much in the records of consumption in Massachusetts during the past few years to encourage the hope that private and public hygiene are already anticipating and averting its ravages. The following table will make the gratifying fact apparent that consumption is really diminishing in fatality. It well illustrates the value of vital statistics, since without their aid it could not be proved.

The population for each year is derived from a table published in the report of the census for 1865, and is based upon the ratio of increase found to prevail in each period of five years.

Mortality from Consumption in Massachusetts in each of the past sixteen years.

YEARS.	Population.	No. of Deaths from Consumption.	Deaths from Consumption to each 100,000 living.
1853, . . .	1,075,007	4,593	427
1854, . . .	1,103,351	4,611	418
1855, . . .	1,132,364	4,750	419
1856, . . .	1,151,455	4,701	408
1857, . . .	1,170,862	4,625	395
1858, . . .	1,190,592	4,574	384
1859, . . .	1,210,656	4,704	388
1860, . . .	1,231,066	4,557	370
1861, . . .	1,238,110	4,522	365
1862, . . .	1,245,310	4,269	343
1863, . . .	1,252,500	4,667	372
1864, . . .	1,259,710	4,733	376
1865, . . .	1,267,031	4,661	368
1866, . . .	1,274,310	4,600	361
1867, . . .	1,281,700	4,362	340
1868, . . .	1,289,200	4,437	344

A comparison of the first two columns shows at a glance that the number of deaths does not increase with the population, and in the third column, representing the mortality to a fixed number of the people, the constant improvement is plainly seen; not always from one year to the next, but perfectly evident when two or three years are taken together.

Comparing the first group of five years with the last group of five years, it is seen that the annual gain in each 100,000 of the population is 54 lives; this gives as the actual saving of life in the last five years 3,440 persons, or 688 in each year. From some cause, or combination of causes, deaths from consumption in Massachusetts have diminished by that amount, and the improvement seems to be still going on. It is of the utmost importance to discover what these causes are; but here statistics fail us, and we are left to conjecture. Our own belief is that they are to be found in *the advance of medical science*, which has given to physicians a better knowledge of the nature of the disease, derived from pathology; a better mode of treatment, derived from the careful observation of cases, and from modern discoveries in chemistry and physiology; and a greatly improved acquaintance with the means by which consumption may be avoided by those predisposed to it by inheritance, derived from all these sources combined.

This knowledge is becoming diffused among the people, so that all intelligent persons now know more about the prevention of consumption than the wisest physicians knew fifty years ago.

Fresh air by day and by night, strong and nourishing food, dry soil on which to live, sunlight, and warm clothing, are the means of saving many lives which would have been hopelessly lost in the preceding generation. If our conjectures are correct, this improvement may be expected to continue, and everybody can help to make it greater. Ventilate the schoolrooms, and the workshops, and the stores, and the houses. In cold weather let the air, comfortably and equally warmed, be generally supplied from without in a constantly flowing current. Let those who can provide it in their homes remember that an open fire, which sends two-thirds of the heat up the chimney, furnishes the best ventilation for a room of moderate size which the ingenuity of man has yet devised, and that the heat escaping by the flue is the price to be paid for it. Let in the sunlight, and never mind the carpets; better they should fade than the health of the family. When a man proposes to build a dwelling in a swamp, warn him of his danger.

Let us look at another class of diseases. Scarlet fever, measles, smallpox and kindred eruptive fevers; syphilis, also, which under various disguises is always making terrible havoc, and by no means only among the vicious. All these destroyers of life are propagated by *contagion.* In view of this fact it has been proposed that they should be *stamped out*, extinguished, made an end of.

Such a proposal looks visionary. It is certainly impracticable at the present time, and yet is perfectly consistent with what we know of the manner in which these diseases are propagated.

Look at the following facts, derived from the English registration reports, and see if this is not so:—

In one of the Faroe Islands, a remote place rarely visited by strangers, but containing 7,782 inhabitants, there had been no measles for sixty-five years. In 1846 it was imported by a sick sailor, and 6,000 of the people took the disease.

In the Scilly Islands, with an average mortality from other diseases, no death occurred from either smallpox, measles or scarlet fever for ten years, 1851 to 1860. In both these instances the sole exciting cause, *contagion*, was wanting for long periods.

We have now referred to three groups of diseases which combined are responsible for at least half of the annual deaths in this community.

First. Typhoid fever taken as a type of the zymotics, with whom its connection is more or less intimate; born of impurity, of the decomposition of organized substances.

Second. Consumption, or that depraved condition of the body which is marked by tubercular deposit in the lungs; a disease having for two of its recognized causes, first, "collective in-door occupations" which may be regarded as almost synonymous with the habitual inhalation of air rendered foul by respiration; and, second, *soil moisture.* The third group has for its exciting cause *contagion*, and that alone.

If these things are so, the prevention of the special excitant of these conditions will prevent the special mode of death or the contraction of the special disease, connected with it by the inexorable law of cause and effect, and this is proved by experience. In the great lying-in hospital of Dublin, during twenty-five years before ventilation was introduced, the mortality of new-born infants in the first two or three weeks of life was one in six. In the twenty-five years following the introduction of good air, the mortality was one in one hundred and four. In Liverpool, before the city was purified and people compelled to live above ground, the annual death-rate was 38 in 1,000; after these measures, 24 in 1,000.

In the group of English towns before referred to, after the establishment of drainage, the deaths diminished.

In our army during the recent war, military necessity sometimes required that ground which had been occupied by the enemy should be occupied by our troops. If this ground was scored with trenches, and percolated with the liquid waste and refuse of the camp, it always caused fever and diarrhœa, and these diseases were either entirely removed or diminished by changing camp to fresh ground.

The epidemic of fever at the Maplewood Institute in Pittsfield a few years ago, was caused by an accumulation of filth, and ceased on removal of the cause.

Instances of this sort, where the cause has been sought for and found, and the epidemic thereby stayed, are so numerous that we need not cite them.

The special danger in a battle is the being hit with bullets; yet a majority of those exposed escape, and so it often is with those exposed to the less evident dangers of air rendered unfit for breathing, by being charged with putridity, or the dwelling upon undrained soil, or direct contact with virulent contagious poisons. In all these cases, the true relation of cause and effect, which would frequently elude us in the individual, becomes evident in the comparison of great numbers. We often, for instance, hear it said by persons in apparently sound health, that the conditions under which they live must be good and healthful, because they do not suffer. Much self-deception is practised in this way. Unwholesome influences may for a long time be resisted by a vigorous constitution; yet the time at last arrives when they show their power. In such cases, we may often observe the effects upon children when they are not evident in the parents. In fact, it may be taken as a rule that the condition of young children is a sensitive gauge of the sanitary influences of a district or neighborhood.

The prevention of disease may be considered,—

First, as regards the individual, or family, or household; and second, as regards the community at large.

What power have we to ward off disease from our own homes? There are certain dangers to which we are exposed which a prudent head of a family may constantly bear in mind. One of these, and by far the most important, is from insufficient ventilation. Every man, woman and child is entitled to their full ration of fresh air—to that amount which will both dilute and quickly remove all which has been spoiled by respiration and combustion, and by the mixture of dead organic particles, which the lungs and skin are constantly throwing off. This organic matter is our deadly foe, since it quickly undergoes decomposition. This we may perceive when, coming from the outer air, with our sense of smell unblunted, we enter a small bed-room which has been closed and occupied during the night. But this is not all the mischief which it does. Our houses are strewn with dead organic matter in invisible particles, and upon such particles the action of decomposition is readily set up by the effete matter discharged from our bodies, as fermentation is excited by the yeast plant, and by the same process.

Fresh air is the great natural disinfectant, antiseptic, and purifier, and not to be compared for a moment with any of artificial contrivance. There is plenty of it in the world, yet disguise the fact as we may, there is no getting over the unwelcome truth, that to provide it in abundance in our climate is expensive, since during seven months of the year it must be artificially warmed. To take in air at the average winter temperature of 28°, raise it to 68°, and discharge it again from our houses even once in an hour, is a process which cannot be accomplished without paying roundly, yet on no other condition can we reasonably expect health and long life. The best way is to freely admit that it is expensive, but worth the money it costs. If Benjamin Franklin thought that "a penny saved is a penny earned," he was also equally sure that "health is wealth." Instead of asking ourselves with how little fuel can I warm my house, by stopping the flues and the beneficent window-cracks which the carpenters have left, the question should be, how much can I *afford to pay* for fresh supplies of pure air, moderately and equally warmed and distributed without waste. I cannot help believing that the sum of family health and happiness in a generation would be more increased by liberal expenditures for this purpose than for any other. But even if we are willing to pay for it, efficient and equal ventilation is not always to be had, and here the builders and architects are to a great degree responsible.

It is not altogether surprising that this should be the case. Architecture was a full-grown art two thousand years ago. Ventilation is modern. It is only a century since oxygen was discovered. Fifty years ago the physiology of respiration was not understood. The agency of foul and putrid air, air filled with decomposing organic material, in causing disease, is a very recent discovery, yet nothing is better established.

To get rid of this poisonous air, and to supply its place with air which is fit for respiration in all weather in our variable climate, and to do this without offensive and dangerous draughts, or excessive heat, is a problem of great difficulty. Its solution does not properly belong to the medical profession, but needs the highest skill of civil engineers and architects. It is very certain that none of the modes of heating and ventilating now in use can be regarded as automatic. They will not run of themselves for six consecutive hours from November to May, and they need the constant care of an intelligent person. The head of a family who takes this responsibility upon himself will be repaid for his time and trouble in the health of his household.

We cannot leave this all-important subject of ventilation without referring to the insensibility to foul air which proceeds from its habitual inhalation. Pure air is admitted by all intelligent persons to be an excellent, a most important, even an essential thing to have in the house, yet we are sure it very often happens that those who so declare their convictions constantly feed their lungs upon air loaded with impurity, and are quite unconscious of it. For this reason, and to avoid the use of words which do not convince if the senses are blunted, we can conceive of no greater addition to human health and happiness than would be afforded by the invention of some instrument, simple in construction, like the thermometer, barometer or hygrometer, which could measure and mark the purity of air, and its fitness for respiration.

Another source of danger in our houses similar to that which we have just referred to, yet seeming to require special mention, is from the retention of decomposing materials in furniture. Dining-room carpets receive a great deal in the debris of food. It is carried about in the air, and in combination with vapor, attaches itself to woollen and cotton textures of every kind, to paper-hangings, to whatever will absorb moisture. A house whose entry smells musty is dangerous. Avoid it. Don't live in it. Keep the children out of it.

Another danger is in a damp cellar. Its atmosphere goes all over the house in spite of every effort to prevent it. It is very common with us in crowded cities to occupy a portion of the house beneath the surface of the ground, either for kitchen, office, or dining-room. It is a custom which only necessity can excuse, and on the score of health cannot be justified. Who would be willing to sleep in such a room if he could sleep anywhere else?

A prudent householder will look closely to the condition of his drains. If they are leaky or obstructed the health of the family will surely suffer; but there is another danger, less obvious, which should be borne in mind. Modern houses are built with water-closets, and set wash-stands on every story. Each of them is in almost direct communication with the air contained in the main sewers of the city; these sewers are open where they empty into the harbor, and exposed to the full force of the wind at certain states of the tide. Our only defence is in the little traps beneath our household conveniences. These are liable to break, to corrode, to wear out; in which case the deadly gases of the sewers may escape in the very rooms in which we sleep.

Most houses in the country are exposed to special dangers from the absence of drains; the refuse from houses being poured upon the ground, thereby infecting not only air, but water also. In some instances the kitchen slops, delivered from a spout upon a limited space, have in the course of time worn a direct channel to the family well. In any case, it may be useful to remember that the soil surrounding a well is drained by it, and that the extent of this drainage may be represented by an inverted cone, of which the base, at the surface of the ground, is equal to from one to three time the depth of the excavation, this difference depending on the porousness of the earth. In this view it will be seen how important it is for the purity of both air and water that pigsties, privies and manure-heaps should be kept at a certain distance from the dwelling. Many a case of typhoid, and much impaired vitality ready to succumb to trifling ailments, might be traced to such pollutions. The disinfecting quality of earth itself fortunately relieves us from the greatest liability to impure well-water, but even this beneficent quality may be exhausted by abuse. We may, in this connection, refer to the remarkable purifying property of earth in other most valuable applications which may be made of it.

The Indians are said to have taught us the fact, that the fetor of the skunk can be removed from clothing by burying it in the earth. Dogs are believed to render putrid meat and bones more palatable by the same process. It has long been known that soils absorb the volatile matters which give the sensation of odors; but, only recently has it been found out, that the process of *drying* earth increases its disinfecting power in an astonishing degree.

Like some other valuable discoveries, it seems surprising that nobody thought of it, or applied it before. But the simple fact is, that the privy may be made as inoffensive as the corn-barn, by the application of about a pint and a half of *dry earth every time it is used.*

There is no need of chloride of lime, or copperas, or carbolic acid, or any other chemical, not readily procured, but *simple earth*, of which there is everywhere (in the country, at least), an abundance, is all-sufficient for the work, and may afterwards be returned to the fields from whence it came, with its value for agricultural purposes greatly increased.

There are one or two things about it important to remember:

1st. It should be *earth* (not sand or gravel), and be thoroughly dried either by exposure to the sun, on shelves, or in some other equally effective way. Fine coal dust will do, but is not as good as earth, either for disinfection or for the land.

2d. The privy-vault must be kept free from rain, from slops, and from excessive moisture of any sort. The more fluid is thrown in, the more dry earth will be needed to absorb it.

How often it happens that a country hotel or boarding-house, crowded with people, becomes, late in the season, disgusting and unhealthy from causes to which we have referred. A few shovels-full of dried earth thrown into the privy, once a day, would remove all offence.

The prevention of disease in the community at large, by the authority of towns, cities, and State, has always been practised to a certain limited extent, but whenever public opinion shall authorize it can be greatly extended. The drainage and water supply * of crowded communities is still insufficient; the erection of buildings for lodging the poor and improvident classes, having every provocation for disease in their arrangements, is freely allowed. The removal of putrefying material from among the living is too often neglected. Narrow and unventilated streets, in crowded towns, are permitted to increase the death-rate of their inhabitants.

The preservation of the health of communities is beginning now to attract the attention which it deserves, although it is, as yet, but imperfectly perceived, either by the medical profession, or the public at large. It was well said some years ago by one whom we all venerate, and who was then in advance of his time, that in certain diseases, as typhoid fever, the duty of the physician was like that of the sea-captain in charge of a ship in a gale of wind. He is as utterly powerless to expel the disease as the seaman to control the winds and the waves. Yet both can so manage their charge, that the best possible opportunity shall be given for surviving the tempest. The truth of this comparison is generally admitted by physicians at the present day.

But suppose the public hygienist can point out whence these storms arise, and what are the laws governing their development; can reach to the half hidden, but definite causes of these perturbations, and distinctly show that they may be suppressed in their origin, that they may be *prevented*, may he not be said to control the winds and the waves, and is not his office one of incalculable dignity and value?

---

* The *quality* of water to be brought from a distance to towns and cities should be closely examined. It is not enough to know that it is *now* pure, but those who are to use it should control all sources of future pollution. Organic impurity we have most to dread, but it should also be free from the salts which make water *hard*. It should dissolve soap readily.

We are all aware of the disposition to exaggeration and over-statement which attends the consideration of such matters, but it is fair to say that the subject itself is vast, that it broadens and deepens as it is contemplated. Take the extreme case of the health of great communities three hundred years ago, and to-day. The plagues of London before its purification by the great fire, and its death-rate in 1866. Liverpool twenty years ago, and Liverpool to-day. The group of great English towns which have been drained and cleaned within the last twenty-five years, and the improvement in the duration of life coincident with these changes. The small mortality in the clean and well-kept houses built by Mr. Peabody, for the poor in London. The diminished mortality in the city of New York, immediately following the measures so efficiently carried out by the Metropolitan Board of Health, a diminution most marked in the wards which had previously been most filthy and most unhealthy.

Now, let us ask ourselves what would be the effect upon the annual mortality in a community like Boston if the wretched cellars, and crystal palaces, and rookeries, and dens, in which the extremely poor and improvident live, could be depopulated, and their occupants transferred to well drained, and lighted, and ventilated buildings, of however cheap and simple construction; if all the foul fluids could be made to quickly depart, by force of gravity, through ventilated sewers; if all the foul solids could be removed without delay in carts provided with the means of arresting putrefaction; if the blind alleys and narrow streets were opened to the circulation of air, and the admission of sunlight; if the old vaults were removed, the old cisterns torn down or filled up, and the general principle of *cleanliness, in its broadest sense*, applied to air, water, and food?

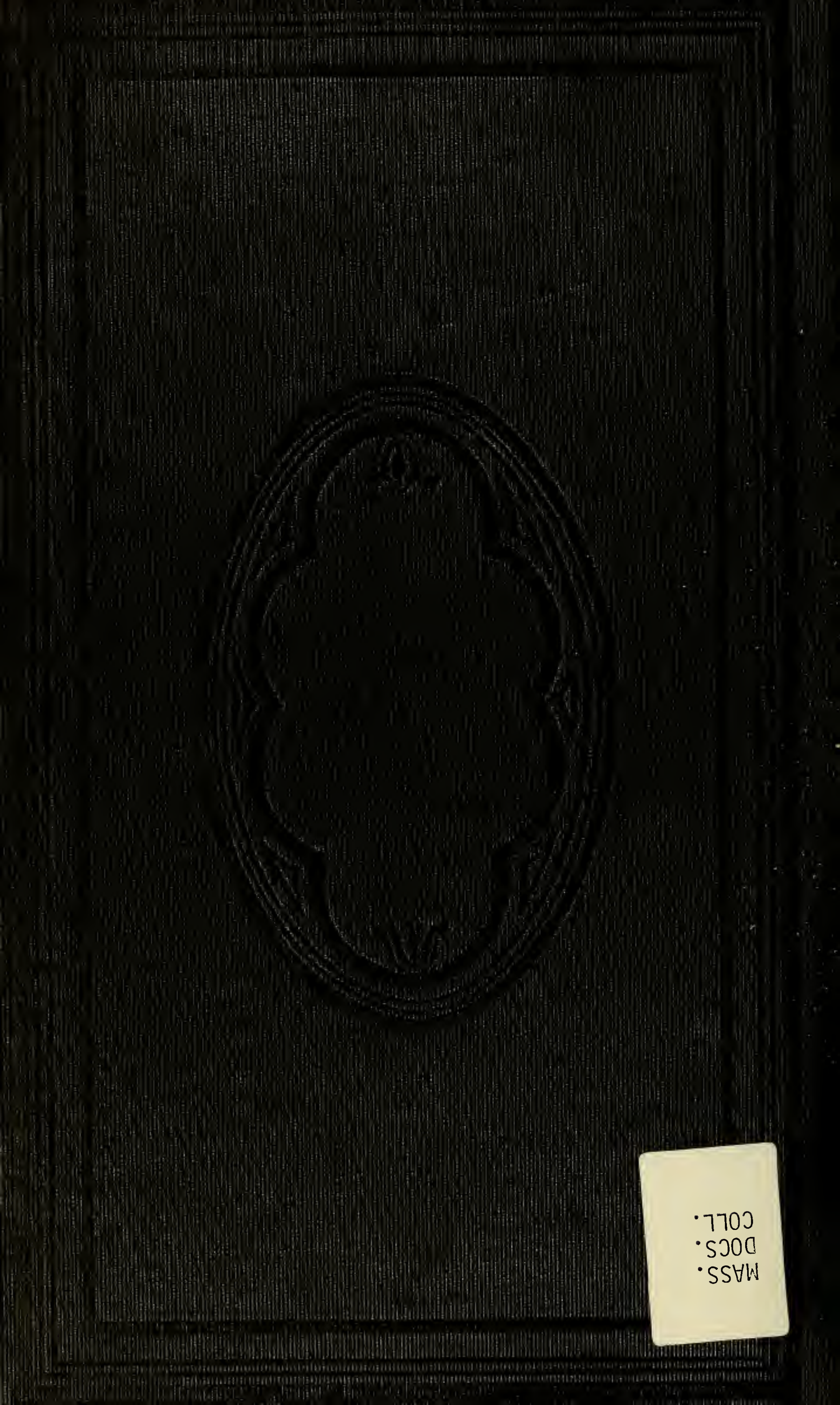
All these reforms are practicable whenever public opinion recognizes their expediency, and gives the necessary authority for their execution. It is for us to aid in bringing the people up to that point, when, for the general welfare, all will be willing to assist in the good work of sanitary improvement, even at the occasional temporary sacrifice of personal convenience and profit. In such a cause no selfish considerations need be appealed to, yet it may be useful to remember that we cannot escape the sanitary influences of the community in which we live. A poison may be generated in another street which will originate disease, or add virulence to the type of one already existing, and which may then overleap all barriers erected about our own dwellings, and strike down those who may be living in fancied security. *Our own immunity from disease cannot be secured without looking after the safety of our less prosperous neighbors.*

We cannot refrain from expressing our belief that the time is not very distant when those having the public health in charge will be held responsible for damages caused by the outbreak of preventable diseases, when the means of prevention have been neglected, as the authorities are now made responsible for broken limbs by reason of defects in the public highway.

EXPENSES

OF STATE BOARD OF HEALTH TO DECEMBER 31, 1869.

Salary of Secretary from Sept. 22 to Dec. 31, 1869,	$687 50
Travelling expenses of Secretary, ...	32 53
Postages, ...	150 12
Express agents, ...	4 20
Paid by Dr. Bowditch for special investigations concerning tenement and model houses, . . .	100 00
Wright & Potter (printing,)	107 00
J. L. Fairbanks & Co. (stationery,) . . .	31 95
E. M. Sawyer (copying,)	26 10
Personal expenses of members of the Board while engaged in its duties, ...	24 00
Miscellaneous expenses, ...	5 58
	$1,168 98



MASS.
DOCS.
COLL.